

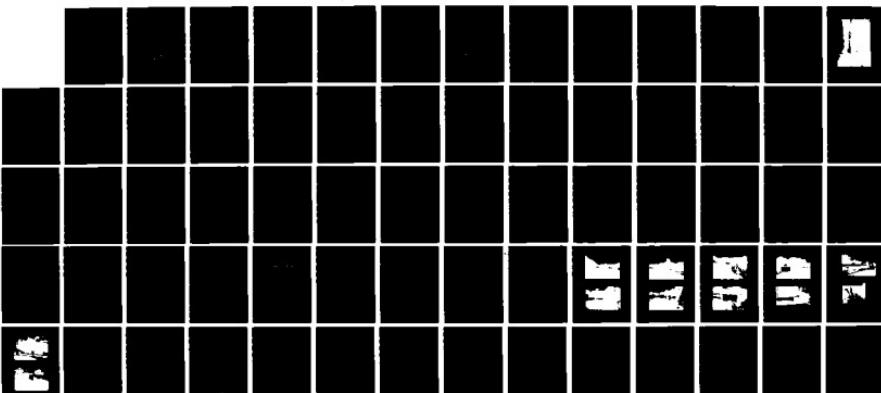
AD-A155 772 NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS
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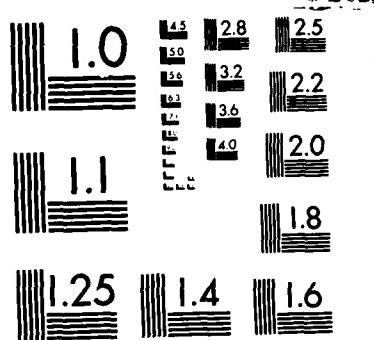
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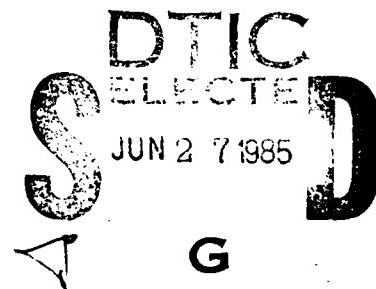
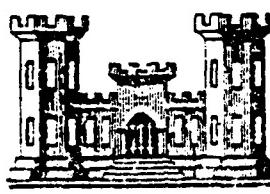
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**SOUTHERN MAINE COASTAL BASIN
YORK, MAINE**

CHASES POND DAM
ME 00188

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM



DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

APRIL 1980

ITEM		MENT A
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UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER ME 00188	2. GOVT ACCESSION NO. AD-H155772	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Chases Pond Dam		5. TYPE OF REPORT & PERIOD COVERED INSPECTION REPORT
NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) U.S. ARMY CORPS OF ENGINEERS NEW ENGLAND DIVISION		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS DEPT. OF THE ARMY, CORPS OF ENGINEERS NEW ENGLAND DIVISION, NEDED 424 TRAPELO ROAD, WALTHAM, MA. 02254		12. REPORT DATE April 1980
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		13. NUMBER OF PAGES 55
		15. SECURITY CLASS. (of this report) UNCLASSIFIED
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) APPROVAL FOR PUBLIC RELEASE: DISTRIBUTION UNLIMITED		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) DAMS, INSPECTION, DAM SAFETY, Southern Maine Coastal Basin York Maine Cape Neddick River		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The dam is about 645 ft. long with a height of about 20 ft. The dam is in fair condition. There were no conditions which would warrant urgent remedial action. The size classification is intermediate with a significant hazard potential. In the event of failure of the dam there would be an extent of downstream development that would be affected.		



DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02154

REPLY TO
ATTENTION OF
NEDED

JUL 22 1980

Honorable Joseph E. Brennan
Governor of the State of Maine
State Capitol
Augusta, Maine 04330

Dear Governor Brennan:

Inclosed is a copy of the Chases Pond Dam Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. This report is presented for your use and is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. A brief assessment is included at the beginning of the report. I have approved the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is a vitally important part of this program.

A copy of this report has been forwarded to the Department of Agriculture cooperating agency for the State of Maine. In addition, a copy of the report has also been furnished the owner, York Water District, 86 Woodbridge Road, York, Maine 03909.

Copies of this report will be made available to the public, upon request, by this office under the Freedom of Information Act. In the case of this report the release date will be thirty days from the date of this letter.

I wish to take this opportunity to thank you and the Department of Agriculture for your cooperation in carrying out this program.

Sincerely,

Max B. Scheider
MAX B. SCHEIDER
Colonel, Corps of Engineers
Division Engineer

Incl
As stated

SOUTHERN MAINE COASTAL BASIN
YORK, MAINE

CHASES POND DAM
ME 00188

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

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APRIL 1980

NATIONAL DAM INSPECTION PROGRAM
PHASE I INVESTIGATION REPORT

Identification No.: ME 00188
Name of Dam: Chases Pond
Town: York
County and State: York, Maine
Stream: Cape Neddick River
Date of Site Visit: 15 November 1979

BRIEF ASSESSMENT

Chases Pond Dam consists of a concrete spillway/gate structure with adjacent concrete walls backfilled on the upstream side, and earth embankments at either end. The crest length of the dam is about 645 ft. in a curved alignment. The height of the dam is approximately 20 ft. The reservoir level of Chases Pond was raised by a reconstruction of the facility in 1950. As part of the reconstruction an approximately 500-ft. long earth dike was constructed at a low area along the reservoir, approximately 1,300 ft. southwest of the dam site. The dam serves as a water supply dam for the Town of York, Maine.

Due to the extent of downstream development that would be affected in the event the dam were to fail, Chases Pond Dam has been determined to have a "significant" hazard potential classification in accordance with Corps of Engineers guidelines.

The dam is in fair condition, based on a visual examination of the structure. Although several deficiencies were noted, there was no evidence of settlement, lateral movement or other signs of structural failure, or conditions which would warrant urgent remedial action.

Based on the "intermediate" size and "significant" hazard potential classifications, in accordance with the Corps of Engineers guidelines, the adopted test flood for this dam is 1/2 the Probable Maximum Flood (1/2 PMF). With the water level at the top of dam, the spillway capacity is approximately 1,600 cfs. Hydraulic analyses indicate that the routed test flood outflow of 1,100 cfs (inflow 1,750 cfs or 425 csm) can be passed with a freeboard of about 1.0 ft. and with an unused surcharge-storage of about 200 acre-ft. remaining.

York Water District, owner of the dam, should engage a registered professional engineer qualified in the design and construction of dams to investigate the structural stability of the second cantilever wall panel to the right of the spillway and

This Phase I Inspection Report on Chases Pond Dam has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and is hereby submitted for approval.

Carney M. Terzian

CARNEY M. TERZIAN, MEMBER
Design Branch
Engineering Division

Richard J. Dibuno

RICHARD DIBUNO, MEMBER
Water Control Branch
Engineering Division

Aramast Martesian

ARAMAST MARTESIAN, CHAIRMAN
Geotechnical Engineering Branch
Engineering Division

APPROVAL RECOMMENDED:

Joe B. Fryar
JOE B. FRYAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the office of Chief of Engineers, Washington, DC 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions will be detected.

Phase I Investigations are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the test flood is based on the estimated "probable maximum flood" for the region (greatest reasonably possible storm run-off), or a fraction thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential. Consideration of downstream flooding other than in the event of a dam failure is beyond the scope of this investigation.

The Phase I Investigation does not include an assessment of the need for fences, gates, no-trespassing signs, repairs to existing fences and railings and other items which may be

needed to minimize trespass and provide greater security for the facility and safety to the public. An evaluation of the project for compliance with OSHA rules and regulations is also excluded.

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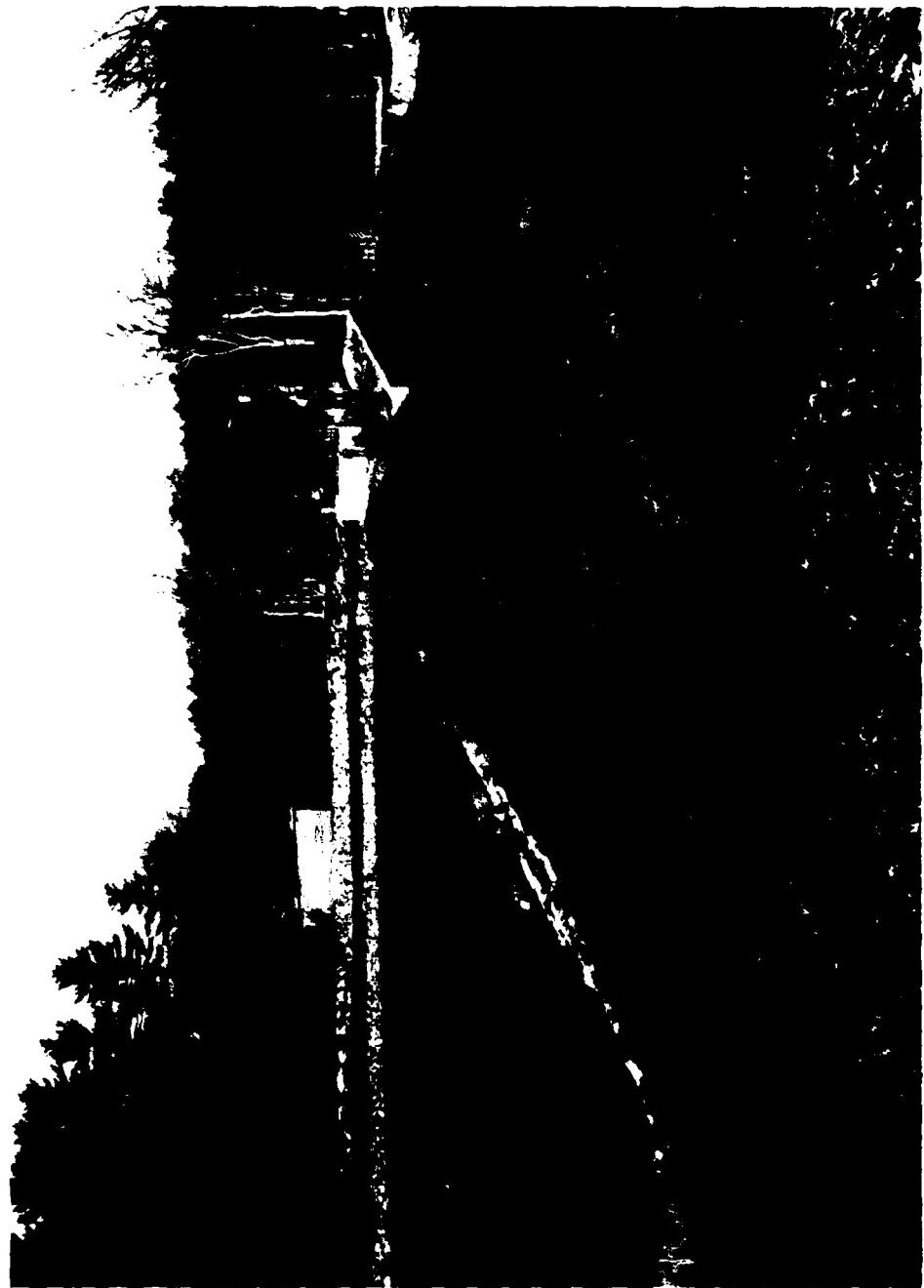
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1. Overview of Chases Pond Dam showing upstream side

The recently constructed water transmission facilities will place those presently in use. The Superintendent of the York Water District reported that the two 16-in. diameter transmission lines will be abandoned but the intakes and operators at the gate structure will be maintained so as to provide additional outlet works discharge capacity.

e. Reservoir Area. Chases Pond is bordered by undeveloped, moderately sloped banks which are heavily forested. The surrounding terrain consists of flat, wooded marshlands. The pond is long and narrow having a length of about 12,000 ft. and an average depth of only about 500 ft. There is no significant probability of landslides into the reservoir which could affect the safety of the dam. No conditions were noted that could result in a sudden increase in sedimentation load into the reservoir.

f. Downstream Channel. The spillway empties into a channel which passes under Chases Pond Road through a 15 ft. wide by 9.25 ft. high bridge opening. There is a small depression in the ground located downstream of the left gravity wall adjacent to the bridge abutment. It is probable that this depression has been used by local run off. The upstream face of the bridge is 8 ft. from the downstream face of the dam. Approximately 150 ft. downstream of Chases Pond Dam is Little Pond Dam having a spillway crest length of about 30 ft. This dam, and the small pond that it creates, serve to protect the water transmission lines leaving the Chases Pond Dam outlet works from freezing. Approximately 200 ft. downstream of Little Pond Dam, the downstream channel is conveyed beneath the Maine Turnpike through a 8.25 ft. square box culvert before joining the Cape Neddick River.

2 Evaluation

Based on the visual examination conducted on 15 November 1979, Chases Pond Dam is considered to be in fair condition. However, the remedial measures outlined in Section 7.3 should be implemented to correct the noted deficiencies in the dam's concrete surfaces and upstream dry laid stone masonry wall.

The upstream vertical stone wall at this section of the dam, Photo No. 5, is also in generally fair to poor condition. In several places, the stones have collapsed and in many areas they are out of alignment. Generally, the stone wall is in better condition within 50 ft. of the spillway.

The near horizontal portion of the embankment is covered with uncut grass and weeds. There are no brush or trees. There are small depressions from local sloughing within 2 to 3 ft. adjacent to the top of the dry laid stone wall due to the displaced conditions of the wall. The boulder riprap backfilled in this section of the dam is similar to that which occurs on the upstream side of the embankment at its right end.

The voids between some of the larger riprap on the right embankment, Photo No. 4, are filled with smaller stone. However, most of these voids are open. A bed of 1-in. nominal size crushed stone is frequently visible between the voids of the larger riprap. There are occasional weeds and light brush growing through the voids in the stone that comprises the only significant vegetation on the upstream slope.

The top of the embankment is covered by mowed grass in excellent condition, Photo No. 1. The downstream slope is also covered by grass to the shoulder of the adjacent asphalt concrete for Chases Pond Road. The vertical and horizontal alignment of the embankment are good.

c. Dike. The earth dike located to the southwest of the dam, Photo No. 13, has an 8 ft. wide crest paved with 0.75-in. screened stone. The upstream slope is approximately 2.5 horizontal to 1 vertical and is paved with large riprap similar to that used for the dam. The downstream slope is 4 horizontal to 1 vertical and covered with a dense growth of mowed grass.

On the downstream side, the earth dike is a maximum of 6 ft. in height. The crest elevation of the dike in relation to Chases Pond Dam could not be readily verified. The condition of the dike is excellent.

d. Appurtenant Structures. During the site examination, water was apparently being withdrawn through the water transmission pipelines, while the valve for the 6-in. diameter screen chamber drain was closed. The exact operating conditions of the water supply system at the time are unknown. The operability of the reservoir drain was not demonstrated as the Superintendent of the Water District was not present at the site. However, all valves and mechanisms appeared to be in operating condition.

Reconstruction of the left embankment, Photo No. 2, following installation of the new (1979) intake pipe was not yet complete. The top surface had not been brought to the required grade, Photo No. 3, nor had the downstream slope been finally shaped, loamed and seeded. The condition of the earth material placed at this section was soft (following recent rains) and irregular.

Mr. Gary Violette with Kleinschmidt & Dutting engineering consultants for the 1979 work, was present at the site and described the construction of the intake pipe through the left embankment. A previously unreported 1-ft. wide compacted clay cutoff wall on the upstream side of the embankment was exposed during the excavation for the intake pipe. The location of the cutoff wall was viewed during the preliminary site visit on 17 October 1979. The top of the clay was about 2 ft. below existing ground surface and 3 to 4 ft. from the dry laid stone wall. The cutoff wall could be seen at either side of the excavation but how far it extends to the left or right and its bottom elevation are unknown. Mr. Violette indicated that clay backfill was placed in-the-dry to reconstruct the embankment cross-section immediately behind the upstream stone wall. There are no trees or significant brush on the left embankment. The areas that are grass covered were mowed and in good condition.

The condition of the near-vertical dry laid stone wall on the left upstream side, in front of both the left embankment and gravity wall, is variable and generally fair to poor. At many locations, the stone is displaced and at some locations it has fallen off into the reservoir.

The riprap along the left upstream side is continuous from the spillway to the left end of the dam, Photo No. 3. The slope of the riprap is irregular and at the left gravity wall, about 8 to 12 in. below the top of the concrete.

The right cantilever wall, Photo No. 10, evidences early signs of major deterioration of the concrete (see Appendix page A-5). Many of the wall panels have edge and joint deterioration, a longitudinal crack along the top surface of the wall, surface crazing of the concrete and/or efflorescence on the downstream face. The second panel from the spillway, Photo No. 11, appears to have shifted or tilted outward from the alignment of the adjacent wall panels. Other than the second panel, the alignment of the wall is good, Photo No. 6.

The top surface of the wall where it abuts the upstream side of the spillway is deteriorated, Photo No. 7. This low deteriorated area exposes the adjacent cantilever wall backfill to potential scouring during higher than normal discharges over the spillway.

SECTION 3 - VISUAL EXAMINATION

3.1 Findings

a. General. The Phase I visual examination of Chases Pond Dam was conducted on 15 November 1979. The upstream water surface elevation was about 2.4 ft. below the spillway crest that day. An excavation through the left dike for the installation of the new intake pipe was viewed during a preliminary visit on 17 October 1979. However, work was being conducted in-the-wet and the conditions at that time could not be assessed.

In general, the project was found to be in fair condition. Several deficiencies which require correction were noted.

A visual inspection check list is included in Appendix A and selected photographs of the project are given in Appendix C. A "Site Plan Sketch", page C-1, shows the direction of view for each photograph.

b. Dam. The masonry portions of Chases Pond Dam, which include the spillway/gate structure, left gravity wall, right cantilever wall and dry laid stone wall along the upstream side, are generally in fair condition. The earth embankment at either end of the dam are in fair to good condition.

The spillway/gate structure, Photo No. 8, has a lightly eroded surface, but it does not appear to be of significance. There is a crack or opening near the spillway crest apparently where concrete placed for the 1950 reconstruction of the dam abuts the original concrete. Minor spalling, Photo No. 7, and areas of moisture were on the spillway surface but the conditions are not extensive. The upstream side of the intake or gate portion of the structure appeared to be a more recent placement of concrete and was in good condition. The downstream side of the structure, especially the lower regions, showed efflorescence, spalling, some cracking and general surface deterioration.

The visible portion of the gravity wall to the left of the spillway, Photo No. 9, has very pronounced surface deterioration in the lower region of the downstream face. Other portions of this wall have surface crazing, efflorescence and shrinkage cracks. The major portion of the wall's downstream side is covered by an earth fill shell with a well vegetated surface of mowed grass.

b. Adequacy. There was a considerable amount of engineering data available to aid in the evaluation of Chases Pond Dam. A review of these data in combination with visual examination, preliminary hydraulic and hydrologic computations, consideration of past performance and application of engineering judgement, was adequate for the purposes of a Phase I assessment.

c. Validity. The information contained in the engineering data may generally be considered valid. However, details on the drawings are shown as designed and may vary from those actually built. For example, the full extent and exact configuration of the cut off wall to the left of the dam is unknown. Also, the crest of the spillway was designed to be reconstructed at El. 157, however, the Superintendent of the York Water District in his own topographic survey of the site established the spillway crest elevation as being El. 157.6.

SECTION 2 - ENGINEERING DATA

2.1 Design Data

In 1906, a concrete gravity dam was designed and constructed at the site for private interests known as the York Shore Water Co. An original plan by R.W. Libby, Engineer, of Saco, Maine, was located at the offices of the York Water District (see Appendix page B-2). This plan was addressed to Mr. Josiah Chase indicating that the dam may have been built by personnel employed by him.

The storage capacity (reservoir level and area) of Chases Pond was increased by a reconstruction of the dam in 1950. The modifications to the then existing facility were designed by Metcalf & Eddy, Engineers, (see Appendix pages B-3 through B-5) and constructed by Varwood Co., Inc. It is believed that Varwood Co., Inc., once of Wakefield, Massachusetts, is no longer in existence.

During 1979, an intake structure and screen house were constructed at the left side of the dam (see Appendix page B-6). Design plans for the work may be obtained from Kleinschmidt & Dutting, Consulting Engineers. This work was contracted by Bradley Environmental Constructors of Rochester, New Hampshire.

2.2 Construction Data

Drawings prepared for the reconstruction of the dam show the general configuration of the then existing dam, built in 1906, and were the only as-built information located for the original dam. No as-built information or records documenting the work during the reconstruction of the dam were located and none are believed to exist. As of the date of this report, all the work on the 1979 additions was not complete and records, in turn, were not available.

2.3 Operation Data

No operational data, other than reservoir levels and water usage records, were located.

2.4 Evaluation of Data

a. Availability. A list of the engineering data available for use in preparing this report is included in page B-1. Selected documents from the listing are also included in Appendix B.

6. Zoning.....	Pervious fill (shells) over im-	
	pervious core with rip rap on	
	upstream side	
7. Impervious core.....	Impervious fill exact composi-	
	tion unknown	
8. Cutoff.....	Below imper-	Approximately
	vious core,	2 ft. above
	exact extent	prior grade
	unknown	
9. Grout curtain.....	None known to exist	
10. Other.....	Earth embankments (dam and dike)	
	were built in 1950 reconstruction	
	of the facility	

h. Diversion and Regulating Tunnel..... Not applicable

i. Spillway

1. Type.....	Concrete ogee with 1.5H to 1.0V inclined U/S face
2. Length of weir.....	35 ft.
3. Crest elevation.....	157.6
4. Gates.....	None
5. U/S channel.....	Chases Pond, approx. 14 ft. in depth at U/S face of spillway
6. D/S channel.....	Side channel discharge spillway with concrete slab on ledge leading to Little Pond
7. General.....	Little Pond Dam (approx. 10 ft. in height) located about 150 ft. D/S of dam

j. Regulating Outlets. The existing intake facilities, or gate structure, located at the left side of the spillway, incorporate an 18-in. by 24-in. sluice gate controlled reservoir drain at invert El. 143.7, two 16-in. diameter water transmission lines at invert El. 145.7 and a 6-in. diameter drain for the screen chamber. The 18-in. by 24-in. reservoir drain is gated within the gate chamber and the 16-in. transmission lines are each gated within the screen chamber and at the downstream face of the gate structure, as is the 6-in. drain. In addition to the above intake facilities presently in use, there is a 30-in. diameter intake line located through the left earth embankment to the recently built (1979) screen house at about an invert El. 145.8.

c. Elevation (ft. above NGVD)

1. Streambed at centerline of dam...	142.4
2. Test flood tailwater.....	152.0
3. Upstream portal invert diversion tunnel.....	Not applicable
4. Normal pool.....	157.6
5. Full flood control pool.....	Not applicable
6. Spillway crest.....	157.6
7. Design surcharge - original design.....	Unknown
8. Top of dam.....	162.7
9. Top of dike.....	162.7
10. Test flood surcharge.....	161.7

d. Length of Reservoir (mi. estimated)

1. Normal pool.....	2.3
2. Flood control pool.....	Not Applicable
3. Spillway crest pool.....	2.3
4. Top of dam.....	2.7
5. Test flood pool.....	2.6

e. Storage (acre-ft.)

1. Normal pool.....	1,180
2. Flood control pool.....	Not applicable
3. Spillway crest.....	1,180
4. Top of dam.....	2,130
5. Test flood pool.....	1,930

f. Reservoir Surface (acres)

1. Normal pool.....	157
2. Flood control pool.....	Not applicable
3. Spillway crest.pool.....	157
4. Top of dam.....	196
5. Test flood pool.....	188

<u>g. Earth Embankments</u>	<u>Dam</u>	<u>Dike</u>
1. Type.....	Zoned earth fill (See Appendix pages B-3 and B-5)	
2. Crest length.....	645 ft.	500 ft.
3. Height.....	20 ft. (at spillway)	6 ft. (at maximum section)
4. Top width.....	10-12 ft. left side; 7 ft. right side	8 ft.
5. Side slopes.....	2H to 1V both U/S and D/S	2.5H to 1V U/S 4H to 1V D/S

i. Normal Operational Procedures. There is no formal written procedure for the operation of the dam. Water is withdrawn in response to demand by the York Water District. There are no provisions for flashboards and the reservoir is not lowered in anticipation of spring run-off. The water supply intake screens are cleaned as needed.

1.3 Pertinent Data

All elevations reported herein refer to an as-built spillway crest elevation, provided by the Superintendent of the York Water District. The datum for the elevation is the National Geodetic Vertical Datum (NGVD).

a. Drainage Area. The drainage area tributary to the dam site is 4.1 sq. mi. The watershed is primarily undeveloped and heavily forested. With the exception of about 8 percent of the watershed which drains Mt. Agamenticus, the terrain is typical of flat and coastal drainage basins. The normal surface area of Chases Pond is 157 acres or about 6 percent of the total drainage area.

b. Discharge at Dam Site

1. Outlet works.....	50 cfs through the 18-in. by 24-in. reservoir drain (invert El. 143.7) with water surface at spillway crest
2. Maximum known flood at dam site..	Unknown (maximum head on spillway reported at 1.5 to 2.0 ft. during storms in the 1960's)
3. Ungated spillway capacity at top of dam.....	1,600 cfs at El. 162.7
4. Ungated spillway capacity at test flood pool elevation.....	1,100 cfs at El. 161.7
5. Gated spillway capacity at normal pool elevation.....	Not applicable
6. Gated spillway capacity at test flood pool elevation.....	Not applicable
7. Total spillway capacity at test flood pool elevation.....	1,100 cfs at El. 161.7
8. Total project discharge at test flood pool elevation.....	1,100 cfs at El. 161.7

e. Ownership. The name, address and phone number of the current owner of Chases Pond Dam are:

York Water District
86 Woodbridge Road
York, Maine 03909
Phone (207) 363-2265

The York Water District has owned the dam since 1929.

f. Operator. Mr. David C. Michniewicz, Superintendent of York Water District, is responsible for operation, maintenance and safety of the dam. Mr. Michniewicz has been the Superintendent of the York Water District since 1976 and his phone number is (207) 363-2265.

g. Purpose of Dam. The dam was constructed to form a water supply reservoir for the Town of York, Maine, and has always been used for this purpose.

h. Design and Construction History. A blue print drawing entitled "Plan of Proposed Concrete Dam" and dated October 1906 for the original dam (see Appendix page B- 2), shows plan, elevation and cross-section views of the then proposed dam. The spillway crest of the original dam, intrepreted from more recent drawings, was at about El. 154.6. The 1906 drawing shows 2 ft. of freeboard from the spillway crest to the top of the gate structure, at its left, and training wall, on its right. It is probable that the prior top of dam was at an elevation of about El. 156.6.

In 1950, the facility was reconstructed to its present configuration, to increase the storage capabilities of Chases Pond. As part of this work, the spillway crest was raised. Concrete walls were built at either side and adjacent to the spillway/gate structure, and the earth embankments were constructed at the ends of the walls to the left (north) and right (south) of the spillway (see Appendix pages B-3 through B-5). In addition, due to the raised level of the reservoir an earth dike had to be constructed at a low area along the reservoir approximately 1,300 ft. southwest of the dam site.

The recent (1979) additions to the facility only affected the left (north) embankment. Installation of the 30-in. diameter intake pipe required that the embankment be breached and excavated to an elevation about 22.3 ft. below the top of the embankment. A cut-off wall was designed to be located around the intake pipe between the embankment and reservoir. The new facilities will replace the intakes and transmission lines presently in use.

The concrete wall on the right of the dam has a cantilever stem, vertical upstream face and a slightly battered downstream face. On the upstream side, the heel of the base slab has a sloped backfill with riprap protection. A horizontal berm between the riprap and dry laid stone wall along this length of the dam is about 8 ft. wide. A paved gutter provides protection for the downstream toe of the base slab. The alignment of this wall is in two straight sections. The section from the spillway to the change in alignment is about 40.5 ft. long and is made up by two wall panels which also have the greatest wall height. The section after the change in alignment is about 145 ft. long.

The riprap for the embankment dike at the right end extends to the waters edge except for about 80 ft. at the extreme right end where the shoreline projects out into the reservoir. The maximum height of the embankment is approximately 6 ft. with a crest width of about 7 ft. The embankment has a straight alignment with a crest length of about 175 ft. The riprap on the upstream side of the embankment is the same as other portions of the dam, however, there is no evidence of a dry laid stone wall or horizontal embankment section.

The top of both walls is about 5.1 ft. above the spillway crest and a minimum of 2 ft. below the crest of the embankments at either end. During high project discharges, water would flow over the concrete walls before overtopping the embankments; the walls acting analogous to an emergency spillway. Along the downstream side of the right (cantilever) wall, the bituminous paved gutter forms a formal spill area for potential over-flowing water in addition to conveying surface runoff.

An approximately 500-ft. long earth dike is located along the southern end of Chases Pond about 1,300 ft. southwest of the dam. The dike provides protection for Scituate Road, located at the immediate downstream toe of the dike.

c. Size Classification. The storage to the top of Chases Pond Dam is estimated to be 2,130 acre-ft., and the corresponding hydraulic height of the dam is approximately 20 ft. Storage of from 1,000 to 50,000 acre-ft. and/or a height of from 40 to 100 ft. classifies a dam in the "intermediate" size category, according to the guidelines established by the Corps of Engineers. Although the height of this dam is less than 40 ft., it is classified as an "intermediate" size dam by virtue of its storage capacity.

d. Hazard Classification. Dam failure analysis computations in Appendix D, which are based on Corps of Engineers "Guidance for Estimating Downstream Dam Failure Hydrographs", demonstrate why this dam has been determined to have a significant hazard potential classification. A failure of the earth embankment located to the left of the spillway would inundate one existing house and the potential loss of life would be a few.

b. Description of Dam and Appurtenances. Chases Pond Dam consists of concrete spillway/gate structure with adjacent concrete walls backfilled on the upstream side and earth embankments (north and south dikes) at either end. Riprap at about a 2 horizontal to 1 vertical slope, and a near-vertical dry laid stone masonry wall, form continuous features along the upstream side of the dam. The crest length of the dam is about 645 ft. in a curved alignment. The height of the dam, at the spillway, is approximately 20 ft.

The spillway is concrete for its 35 ft. length, has an ogee shape and is in a side channel orientation (see Appendix page B-4). No sockets for pins or other provisions for flashboards are provided along the spillway crest. On the downstream side of the spillway the discharge channel is formed by exposed bedrock.

The gate structure forms the left spillway training wall and incorporates two 16-in. diameter water transmission lines and an 18-in. by 24-in. sluice gate controlled reservoir drain (see Appendix page B-5). A screen chamber is located within the structure and operators for the different gates are located at its top. The right spillway training wall and the left side of the gate structure both abut the concrete walls that extend to either side along the dam alignment.

The top of the left concrete wall is about 1 ft. wide, the upstream side is vertical and the downstream side sloped. From the dry laid stone wall at the reservoir edge to the toe of the sloped riprap backfill is a horizontal berm (see Appendix page B-5). The width of the berm increases from about 10 ft., adjacent to the gate structure, to about 20 ft., at its convergence with the left embankment. The wall extends approximately 45 ft. in a bowed alignment from the end of the gate structure before it meets the left embankment. The alignments of the wall and embankment approximately form a right angle.

The left embankment cross-section includes a dry laid stone wall at the reservoir edge, a horizontal berm approximately 20 to 25 ft. in width and a boulder paved slope to the crest of the embankment. The maximum height of the embankment is about 8 ft. with a crest width of 10 to 12 ft.

A recently constructed screen house (see Appendix page B-6) is located on the downstream side of the left embankment. A 6-ft. by 6-ft. by 8-ft. long box culvert is connected to the screen house by a 30-in. diameter intake pipe. An existing 30-in. diameter transmission main will be connected to the screen house and convey flow to the York Water District's pumping station located about 800 ft. downstream of the dam.

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
CHASES POND DAM
ME 00188

SECTION 1 - PROJECT INFORMATION

1.1 General

a. Authority. Public Law 92-367, 8 August 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of Dam Inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England region.

Haley & Aldrich, Inc. has been retained by the New England Division to inspect and report on selected dams in the States of New Hampshire and Maine. Authorization and notice to proceed were issued to Haley & Aldrich, Inc. under a letter dated 31 October 1979 from Colonel William E. Hodgson, Jr., Corps of Engineers. Contract No. DACW33-80-C-0009 has been assigned by the Corps of Engineers for this work. Camp, Dresser & McKee, Inc. was retained as consultant to Haley & Aldrich, Inc. on the structural, mechanical/electrical and hydraulic/hydrologic aspects of the investigation.

b. Purpose of Inspection. The primary purposes of the National Dam Inspection Program are to:

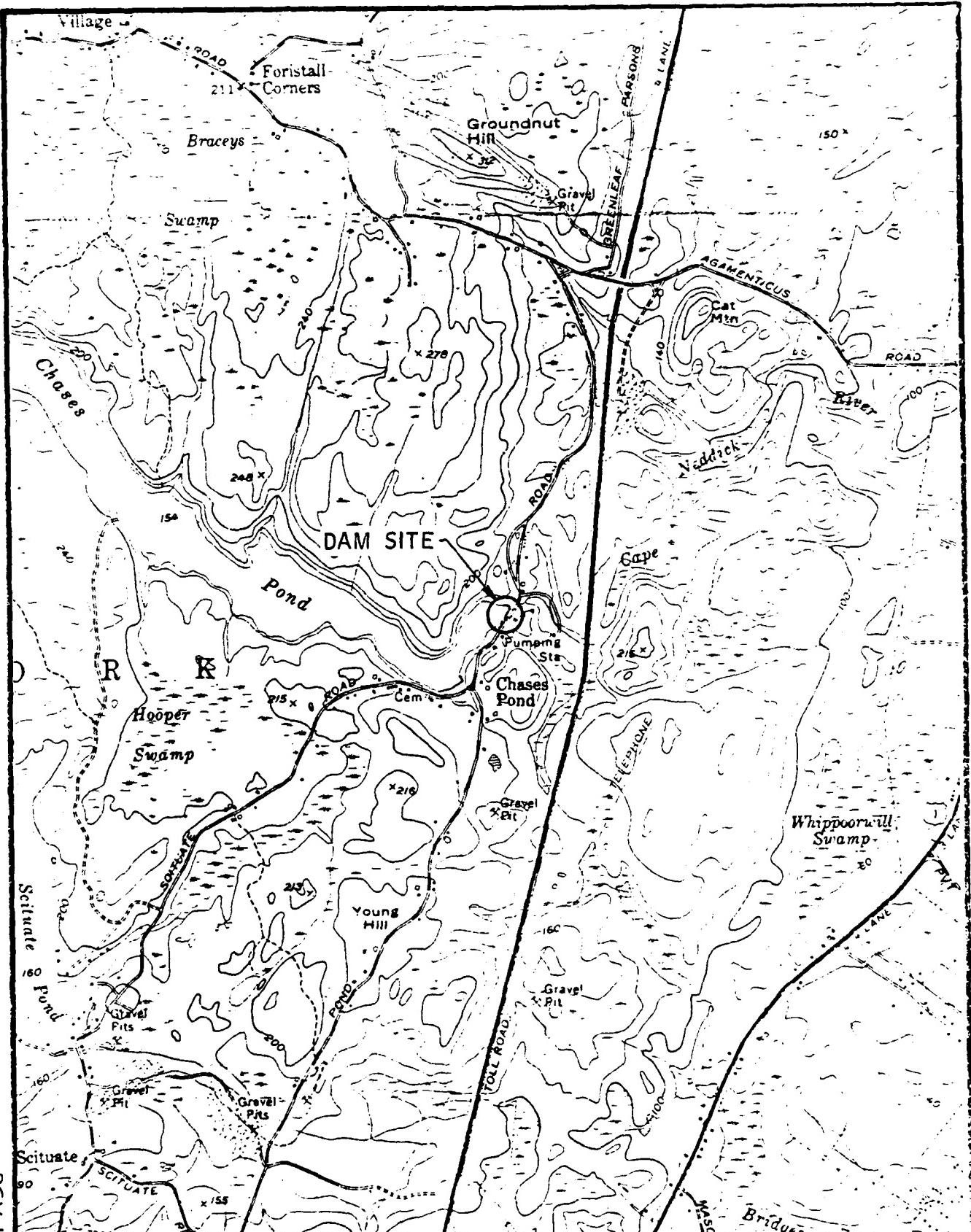
1. Perform technical inspection and evaluation of non-Federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-Federal interests.
2. Encourage and prepare the states to initiate effective dam safety programs for non-Federal dams.
3. Update, verify and complete the National Inventory of Dams.

1.2 Description of Project

a. Location. The dam is located at the eastern end of the reservoir it forms, Chases Pond, as shown on the Location Map, page vii. The latitude and longitude of the dam site are N $43^{\circ}11.5'$ and W $70^{\circ}39.0'$, respectively. Spillway discharge flows from the dam through flat and marshy terrain to the Cape Neddick River at a downstream distance of about 1,200 ft.

FILE NO. 4454 A38

DAM: Chases Pond
IDENTIFICATION NO. ME 00188



LOCATION MAP
U.S.G.S. QUADRANGLE
YORK HARBOR, ME
APPROX. SCALE: 1" = 2000'

SECTION 4 - OPERATIONAL AND MAINTENANCE PROCEDURES

4.1 Operational Procedures

a. General. In general, there are no formal procedures for the operation of the dam. There are no diversion or regulating tunnels nor provisions for flashboards. Water is withdrawn from the reservoir as needed by the Owner.

b. Description of any Warning System in Effect. There is no warning system or emergency preparedness plan in effect for this structure.

4.2 Maintenance Procedures

a. General. There are no established procedures or manuals for inspection and maintenance of the dam. Remedial measures such as the cutting of grass and brush along the embankments is reportedly performed on a regular basis.

b. Operating Facilities. The spillway structure does not appear to receive regular maintenance. There is no formal plan to maintain the reservoir drain and control or to keep the discharge channel free of debris. The operability of the drain was not demonstrated during the site visit as the Superintendent of the York Water District, Operator of the dam, was not present.

4.3 Evaluation

The Owner should prepare an operations and maintenance manual for the dam. The manual should delineate the routine operational procedures and maintenance work to be done on the dam to provide satisfactory operation and minimize deterioration of the facility. For example, an annual observation and maintenance program should be established to examine the dam, control vegetation growth and maintain slopes, walls and channels. A formal procedure should be established to operate the reservoir drain periodically.

Since failure of the dam would probably cause loss of life and property damage downstream, the owner should also prepare and implement a formal emergency preparedness plan and warning system.

SECTION 5 - EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

5.1 General

Chases Pond Dam is a water supply reservoir dam with a 35-ft. long side channel concrete ogee spillway. The spillway has concrete walls at either side, the top of which are 5.1 ft. above the spillway crest. Earth embankments, to the left and right of the concrete walls, have a crest elevation of 2.0 to 2.5 ft. higher than the concrete walls.

The primarily undeveloped 4.1 sq. mi. watershed consists of heavily forested terrain which is drained by numerous small brooks having considerable swamps and marsh. Chases Pond, which represents approximately 6 percent of the drainage basin, is long and narrow having a length of about 12,000 ft. and an average width of only about 500 ft.

5.2 Design Data

No hydraulic/hydrologic design data were located for the dam.

5.3 Experience Data

There are no official records of any major hydrological occurrences at Chases Pond Dam. According to the Owner, the most significant flows were experienced during storms of the 1960's when spillway discharge heads of 18-in. to 24-in. were observed.

5.4 Test Flood Analysis

Based on the Corps of Engineers Guidelines, the recommended test flood range for the size "intermediate" and hazard potential "significant" is the 1/2 PMF to PMF (Probable Maximum Flood). The 1/2 PMF was selected for the test flood as the storage of the facility places it near the low end of the size classification range. The PMF was determined using the Corps of Engineers Guidelines for "Estimating Maximum Probable Discharge" in Phase I Dam Safety Investigations. The 4.1 sq. mi. drainage area is typical of coastal basins with the exception of about 8 percent of the watershed which drains Mt. Agamenticus. A peak inflow rate of 850 csm was selected for the PMF inflow which results in a test flood inflow (1/2 PMF) of 1,750 cfs.

Surcharge storage routing of the test flood inflow was performed based on the Corps of Engineers Guidelines for "Estimating Effect of Surcharge Storage On Maximum Probable Discharges". The routed test flood outflow was determined to be 1,100 cfs at a pond stage of El. 161.7. Since the top of dam is at El. 162.7, the spillway is considered adequate to pass the routed test flood outflow.

5.5 Dam Failure Analysis

The analysis was based on the Corps of Engineers Guidelines for estimating dam failure hydrographs and assumes that a failure would occur along 40 percent of the mid-height length of the left earth embankment with pond level at top of dam. This section of the dam is considered to have the greatest potential for loss of life in the event of a failure. The peak failure outflow was determined to be 3,900 cfs in addition to the 1,100 cfs spillway discharge occurring prior to failure. As a result of the assumed dam failure, the York Water District's screening building, located at the toe of the left earth embankment, would be impacted as well as one house, located about 200 ft. downstream of the dam, which has a sill elevation approximately 6 ft. lower than the top of dam. Flooding depths at this structure would be in the order of 4 ft. above the sill elevation. After joining the downstream channel, the combined dam failure outflow and spillway discharge would be conveyed approximately 1,200 ft. to the Maine Turnpike highway embankment. Analysis indicates that the turnpike would not be overtopped as a result of a dam failure at the crossing of the downstream channel. Minor flooding of the turnpike is possible at the location of a second culvert located approximately 700 ft. south. However, such flooding would be of low depth and velocity. By visual inspection of downstream conditions at the earth dike there are no existing structures which would be affected by a failure of this structure.

The potential loss of life resulting from failure of the dam would be a few and the dam is accordingly classified in the "significant" hazard category.

SECTION 6 - EVALUATION OF STRUCTURAL STABILITY

6.1 Visual Observations

With the exception of the second cantilever wall panel to the right of the spillway and the upstream dry laid stone wall, there was no visual evidence of major settlement, lateral movement or other signs of structural instability in the earth fill or masonry portions of Chases Pond Dam. The noted cantilever wall panel did evidence some outward displacement or tilting. This condition could be caused by either construction error or structural yielding. The condition of the dry laid stone has probably been caused as a general deterioration due to wave action at the reservoir's shoreline and warrants attention.

The riprap backfill on the upstream side of both the left gravity and right cantilever walls is lower than the top of the walls. It is possible that these sections were constructed with the configuration or that natural post construction settlement has occurred. In either case, both walls appear, overall, to be in good vertical and horizontal alignment.

6.2 Design and Construction Data

In general, the designed cross-sections of the dam indicate configurations which would be expected to have adequate factors of safety normally used for structures of comparable height with the possible exception of the one cantilever wall panel recommended for investigation in the preceding paragraphs. This particular cantilever wall panel probably has a lower factor of safety than the adjacent panels due to, 1) it has the greatest wall height, 2) it is not restrained by a return wall as in the case of the wall panel to its immediate left, 3) the footing is positioned more to the front of the wall than the other panels and 4) the foundation is at the lowest elevation of all wall panels thus probably having greater upward hydrostatic pressures on the base.

6.3 Post-Construction Changes

At the time of the Phase I Investigation of Chases Pond Dam, a new intake structure and screen house were under construction as previously described in Sections 2.2, 3.1b and 3.1d.

6.4 Seismic Stability

Chases Pond Dam is located in Seismic Zone 2 and in accordance with Recommended Phase I Guidelines does not warrant seismic analysis provided static stability conditions are satisfactory and conventional safety margins exist. One wall panel exhibits some movement indicating conventional safety margins may not exist. Seismic analysis of this section should be performed.

SECTION 7 - ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition. The visual examination of Chases Pond Dam revealed that the structure was in fair condition. Although there were no signs of conditions which would warrant urgent remedial action, deficiencies in the form of one displaced cantilever wall panel, surface deterioration of concrete and deterioration of the upstream dry laid stone wall were noted.

Based on the results of computations included in Appendix D and described in Section 5, the spillway is capable of passing the test flood, which for this structure is the 1/2 PMF, without overtopping the dam. With the water level at the top of the dam, the spillway capacity is approximately 1,600 cfs. The routed test flood outflow of 1,100 cfs (inflow of 1,750 cfs or 425 csm) could be passed with a freeboard of 1.0 ft. and an unused surcharge-storage of 200 acre-ft. remaining.

b. Adequacy of Information. This evaluation of the dam is based primarily on visual examination, preliminary hydraulic and hydrologic computations, consideration of past performance and application of engineering judgement. Generally the information available or obtained was adequate for the purposes of a Phase I assessment. However, it is recommended that additional information regarding the stability of the second cantilever wall panel from the right end of the spillway along the downstream face of the dam and the extent and necessity of repairs to the deteriorated concrete sections, as outlined in Section 7.2, be obtained.

c. Urgency. The recommendations for additional investigations and remedial measures outlined in Section 7.2 and 7.3 respectively, should be undertaken by the Owner and completed within one year after receipt of this report.

7.2 Recommendations

It is recommended that the Owner engage a registered professional engineer qualified in the design and construction of dams to undertake the following investigations:

1. Determine the structural stability, including the seismic stability, of the second wall panel from the right end of the spillway along the downstream face of the dam. The investigation should include the effect of seepage and groundwater pressures on this structural element.

2. Determine the depth of surface deterioration of concrete elements and the necessity and means of repair.

The Owner should then implement corrective measures on the basis of these engineering evaluations.

7.3 Remedial Measures

Although the dam is generally in fair condition, it is considered important that the following items be accomplished.

- a. Operation and Maintenance Procedure. The following should be undertaken by the Owner:

1. Extend the area of riprap adjacent to the right end of the spillway to provide scour protection adjacent to the upstream face of the spillway training wall.
2. Monitor the condition of the left embankment in the area of the 1979 excavation with attention to the development of any transverse cracks or irregular settlement. Observation of the conditions in this area should be maintained for the next two to three years, particularly during high reservoir levels.
3. Fill the small depression in the ground located downstream of the left gravity wall adjacent to the bridge abutment. The area should be monitored to detect any future subsidence.
4. Rebuild the failed portions of the dry laid stone wall. A regular maintenance program to correct future localized failures of the stone wall should be developed.
5. Operate the valves and reservoir drain mechanisms at the gate structure to insure their operability. In addition, a procedure should be established to operate the reservoir drain periodically.
6. Prepare an operations and maintenance manual for the dam. The manual should include provisions for annual technical inspection of the dam and for round-the-clock surveillance of the dam during periods of heavy precipitation and high project discharges. The procedures should delineate the routine operational procedures and maintenance work to be done on the dam to ensure safe, satisfactory operation and to minimize deterioration of the facility.
7. Develop a written emergency preparedness plan and warning system to be used in the event of impending failure of the dam or other emergency conditions. The plan should be developed in cooperation with local officials and downstream inhabitants.

7.4 Alternatives

There are no practical alternatives to the above recommendations.

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APPENDIX A - INSPECTION CHECK LIST

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<u>VISUAL INSPECTION CHECK LIST</u>	A-2
Dam Embankment	A-2
Outlet Works - Intake Channel and Intake Structure	A-3
Outlet Works - Spillway Weir, Approach and Discharge Channels	A-4
Dam - Concrete Portion	A-5

VISUAL INSPECTION PARTY ORGANIZATION

NATIONAL DAM INSPECTION PROGRAM

Dam: Chases Pond

Date: 15 November 1979

Time: 1345 to 1640

Weather: Clear with cold temperatures (approximately 40°F)

Water Surface Elevation Upstream: El. 155.2 (Approximately 2.4 ft.
below top of concrete
spillway weir)

Stream Flow: None

Inspection Party:

Harl P. Aldrich, Jr.

- Soils/Geology

Charles R. Nickerson

Haley & Aldrich, Inc.

Joseph E. Downing

- Hydraulic/Hydrologic

Roger H. Wood

- Structural/Mechanical

Camp, Dresser & McKee, Inc.

Present During Inspection:

Gary Violette, Kleinschmidt & Dutting, Consulting Engineers
(for part of the time)

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: Chases Pond

DATE: 15 Nov. 79

AREA EVALUATED	CONDITION
DAM EMBANKMENT	
Crest Elevation	El. 157.6
Current Pool Elevation	El. 155.2
Maximum Impoundment to Date	Unknown
Surface Cracks	None observed
Pavement Condition	No pavement
Movement or Settlement of Crest	None observed; dike at location of new water intake pipe not restored to final grade on this date, see text
Lateral Movement	None observed
Vertical Alignment	Good
Horizontal Alignment	Satisfactory (curved)
Condition at Abutment and at Concrete Structures	Satisfactory
Indications of Movement of Structural Items on Slopes	No structural items on slopes
Trespassing on Slopes	Unrestricted
Animal Burrows in Embankment	None observed
Vegetation on Embankment	Mowed grass, good condition
Sloughing or Erosion of Slopes or Abutments	None observed of significance
Rock Slope Protection - Riprap Failures	Dry laid stone wall at upstream toe in fair to poor condition; boulder riprap in satisfactory condition Movement at upstream "vertical" dry laid stone wall, see text
Unusual Movement or Cracking at or near Toes	None observed
Unusual Embankment or Downstream Seepage	None observed
Piping or Boils	None observed
Foundation Drainage Features	None known to exist
Toe Drains	None known to exist
Instrumentation Systems	None

A-2

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: Chases Pond

DATE: 15 Nov. 79

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE</u>	(This relates to outlet works adjacent to weir and does not include the separate underwater intake currently under construction and not visible for inspection.)
a. <u>Approach Channel</u>	Intake structure at pond - no approach channel
b. <u>Intake Structure.</u>	
Condition of Concrete	New concrete on upstream face is in very good condition. Older concrete, sides and downstream faces, has a poor exposed surface
Stoplogs and Slots	None observed
Condition of Joints	Not applicable
Spalling	Surface spalls on sides and downstream faces
Visible Reinforcing	None observed
Rusting or Staining of Concrete	None observed
Any Seepage or Efflorescence	Efflorescence on all sides
Joint Alignment	Not applicable
Unusual Seepage or Leaks in Gate Chamber	Not visible
Cracks	Minor shrinkage cracks at top surface and crack at the junction of new and old concrete
Rusting or Corrosion of Steel	None observed
c. <u>Mechanical and Electrical</u>	Three manually operated gates (2 for water supply lines and 1 for waste gate). The gates appear to be operational. No electrical services observed

A-3

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: Chases Pond

DATE: 15 Nov. 79

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - SPILLWAY</u> <u>WEIR, APPROACH AND</u> <u>DISCHARGE CHANNELS</u>	
a. <u>Approach Channel</u>	
General Condition Loose Rock Overhanging Trees Overhanging Floor of Approach Channel	Weir is at edge of pond - no channel None observed None observed Not visible
b. <u>Weir and Training Walls</u>	
General Condition of Concrete Rust or Staining Spalling	Weir downstream surface is eroded. Walls have surface deterioration and spalls None observed Minor surface spalls on weir. Appreciable surface spalls on side walls
Any Visible Reinforcing Any Seepage or Efflorescence Cracks Drain Holes	None observed Channel at base of weir moist. Efflorescence at right downstream side Longitudinal crack at top of weir None observed
c. <u>Discharge Channel</u>	
General Condition Loose Rock Overhanging Channel Trees Overhanging Channel Floor of Channel	Side channel discharge. Back wall is in very good condition. Upstream side wall has efflorescence and surface deterioration None observed None observed Ledge and concrete - good condition

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: Chases Pond

DATE: 15 Nov. 79

AREA EVALUATED	CONDITION
Other Obstructions Bridge over Channel	None observed Bridge appears in good condition but underside not accessible for detailed inspection due to ponded water
<u>DAM - CONCRETE PORTION</u>	The concrete portion of the dam is in the form of walls on each side of the spillway
a. <u>Right Wall</u> (starting at right end)	
1st Panel	Longitudinal crack along top of wall and efflorescence and crazing on downstream face
1st & 2nd Panel Joint	Concrete spall at top and general joint deterioration
2nd Panel	Longitudinal crack along top of wall and efflorescence and crazing on downstream face
2nd & 3rd Panel Joint	Joint deterioration at downstream face
3rd Panel	Crazing on downstream face
3rd & 4th Panel Joint	Joint appears in good condition
4th Panel	Longitudinal crack along top of wall and crazing on downstream face
4th & 5th Panel Joint	Joint deterioration at top of wall and slight efflorescence at downstream face of joint
5th Panel	Longitudinal crack along top of wall and crazing and slight efflorescence on downstream face
5th & 6th Panel Joint	Longitudinal crack opens at joint at the top of wall
6th Panel	Longitudinal crack and edge deterioration along top of wall and crazing and some efflorescence on downstream face
6th & 7th Panel Joint	Joint deterioration present

A-5

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: Chases Pond DATE: 15 Nov. 79

AREA EVALUATED	CONDITION
7th Panel	Panel appears to have experienced some outward movement or tilting. The upstream surface has considerable light efflorescence present. There is edge deterioration along the top and surface loss and efflorescence on the downstream face
7th & 8th Panel Joint	Heavy efflorescence at the downstream face of the joint and general joint deterioration
8th Panel	The upstream return of this wall has considerable deterioration at the weir. The top of the wall has edge deterioration and there is surface loss and efflorescence (heavy in the lower portion) on the downstream face
b. <u>Left Wall</u>	The downstream face has crazing, cracks, efflorescence and surface deterioration present. It has very pronounced surface deterioration present at the bottom of the exposed portion of the wall. The top of the wall exhibits shrinkage cracking and the upstream face of the wall has light efflorescence present

A-6



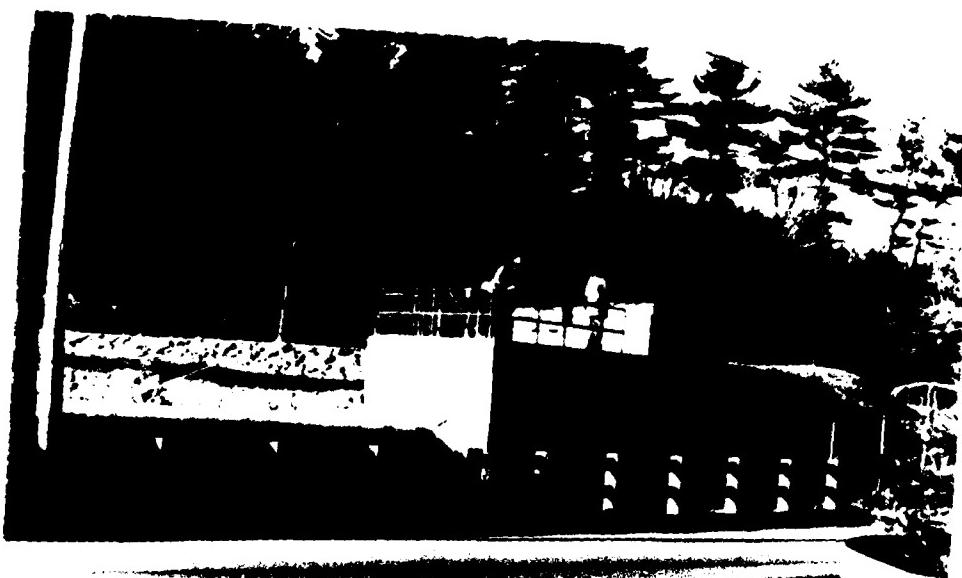
10. Cantilever wall, downstream



11. Tilted canti-
lever wall
panel, down-
stream



8. Spillway/gate structure, upstream



9. Spillway/gate structure and Chases Pond Road,
downstream



6. Alignment of right cantilever wall, spillway and left embankment



7. Alignment of spillway/gate structure, from right side



4. Overview of right embankment and cantilever wall, upstream



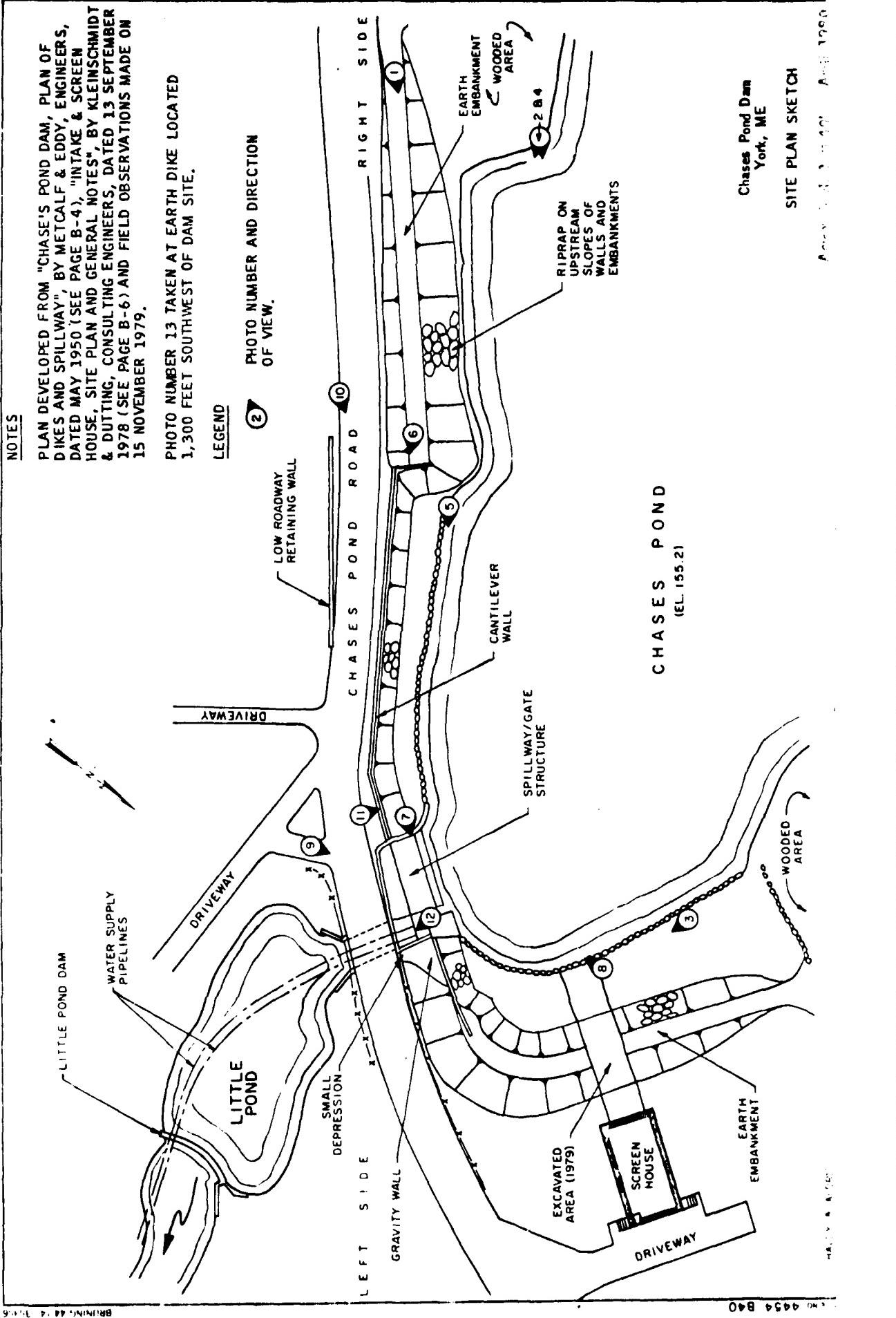
5. Dry laid stone masonry along reservoir at right side



2. Overview of left embankment, upstream

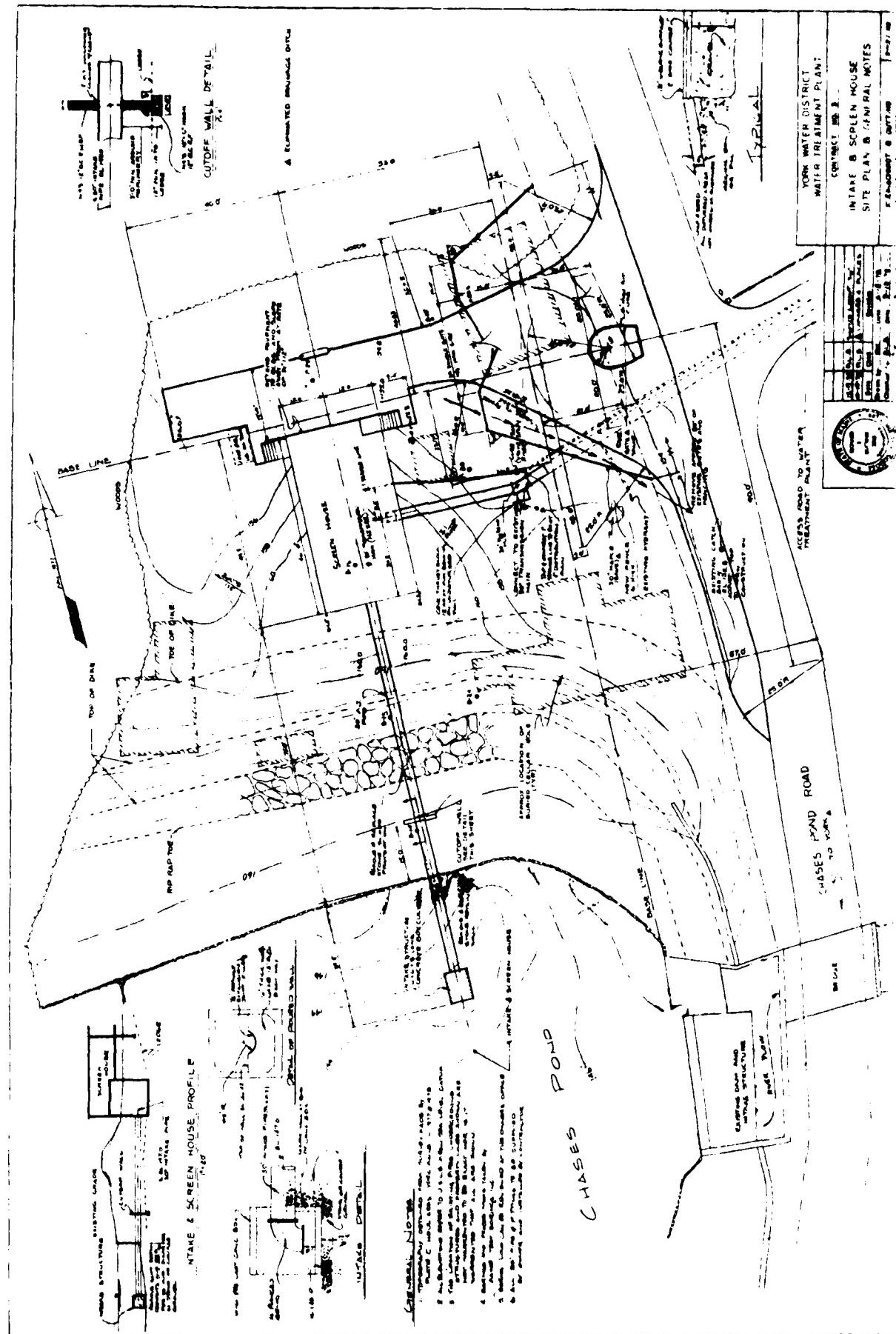


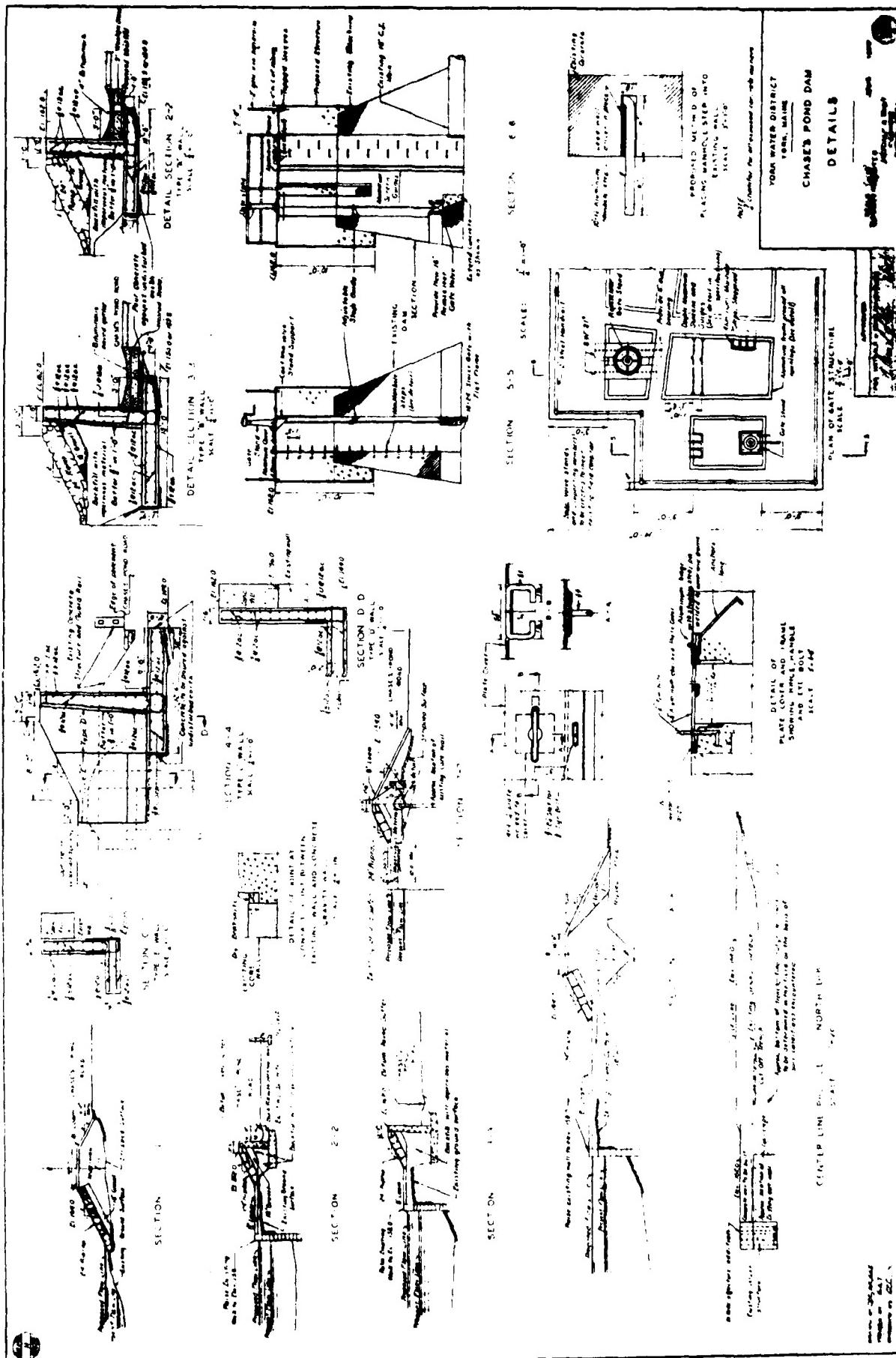
3. Left embankment at location of 1979 work

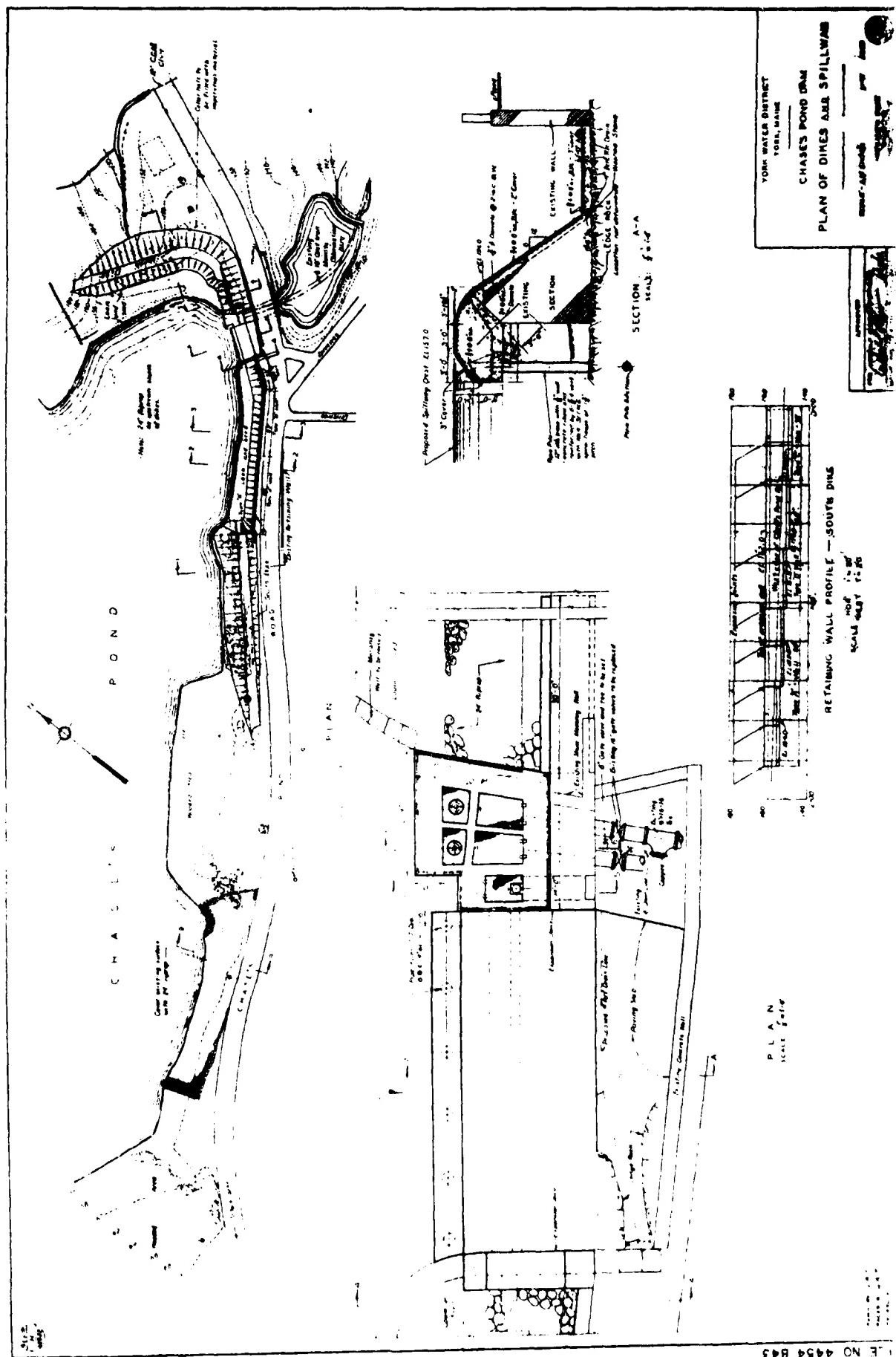


APPENDIX C - PHOTOGRAPHS

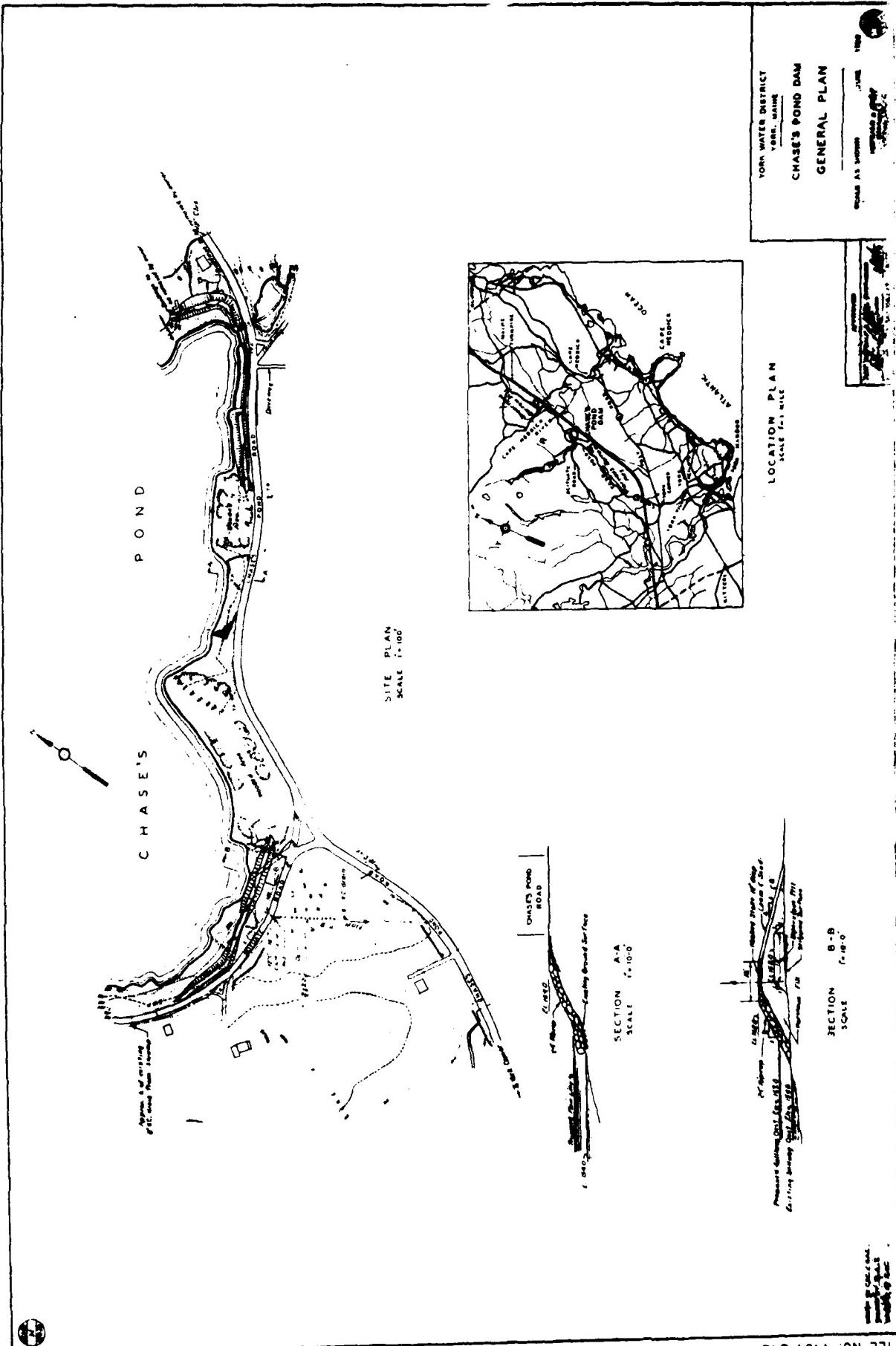
				<u>Page</u>
<u>LOCATION PLAN</u>				
Site Plan Sketch				C-1
<u>PHOTOGRAPHS</u>				
No.	Title	Roll	Frame	<u>Page</u>
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12.	Little Pond and Little Pond Dam	18	22	C-7
13.	Overview of crest, upstream and downstream sides of earth dike 1,300 ft. southwest of dam site	18	24	C-7

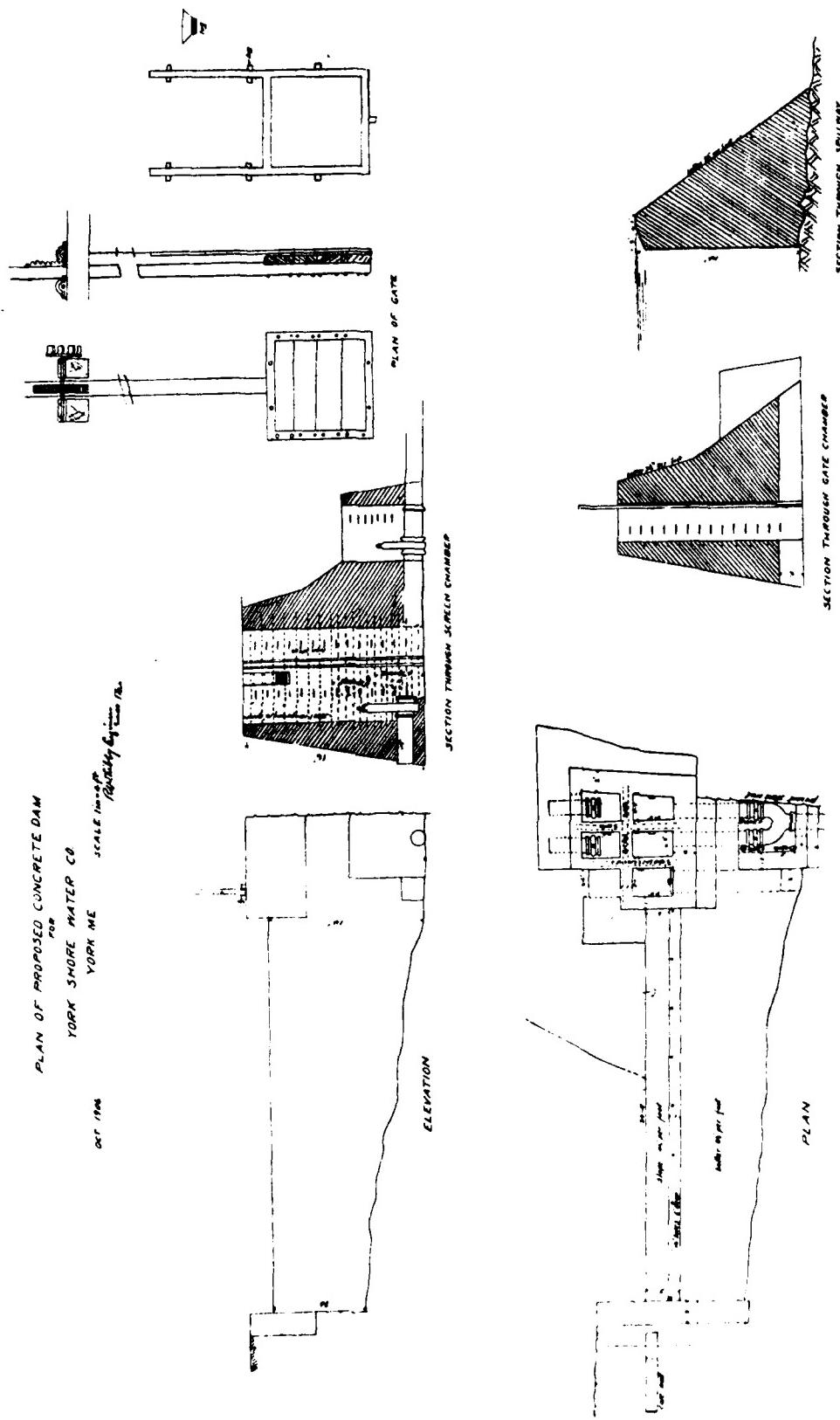






1-E NO 4454 B43





LIST OF AVAILABLE DATA
CHASES POND DAM

<u>Document</u>	<u>Contents</u>	<u>Location</u>
Application for Dam Registration	State of Maine registration form for Chases Pond Dam dated 9 August 1978	Maine Soil and Water Conservation Commission Department of Agriculture State of Maine State Office Building Augusta, Maine 04333
Subsurface Investigation; Proposed Water Treatment Facility, York, Maine	Jordon Gorrell Associates report to Kleinschmidt & Dutting dated 30 January 1978	York Water District 86 Woodbridge Road York, Maine 03909
Kleinschmidt & Dutting letter to State Soil and Water Conservation Commission	Notice of intent to breach the earthen dike that holds Chases Pond dated 9 October 1978	Maine Soil and Water Conservation Commission
Registration of Dam, Renewal Form	State of Maine, registration renewal form for Chases Pond Dam dated 8 February 1979	Maine Soil and Water Conservation Commission
Application for Dam Registration	State of Maine registration form for Little Pond dam dated August 1978	Maine Soil and Water Conservation Commission
Registration of Dam, Renewal Form	State of Maine registration renewal form for Little Pond Dam dated 8 February 1979	Maine Soil and Water Conservation Commission

APPENDIX B - ENGINEERING DATA

	<u>Page</u>
<u>LIST OF AVAILABLE DATA</u>	B-1
<u>PRIOR INSPECTION REPORTS</u>	
None available	
<u>DRAWINGS</u>	
"Plan of Proposed Concrete Dam for York Shore Water Co.; York, Me", by R.W. Libby, dated October 1906	B-2
"Chase's Pond Dam, General Plan", Metcalf & Eddy, Sheets Nos. 1, 2 and 3 of 3, dated June 1950	B-3
"Intake and Screen House Site Plan and General Notes" Kleinschmidt & Dutting, Second revision, dated 13 December 1978	B-6



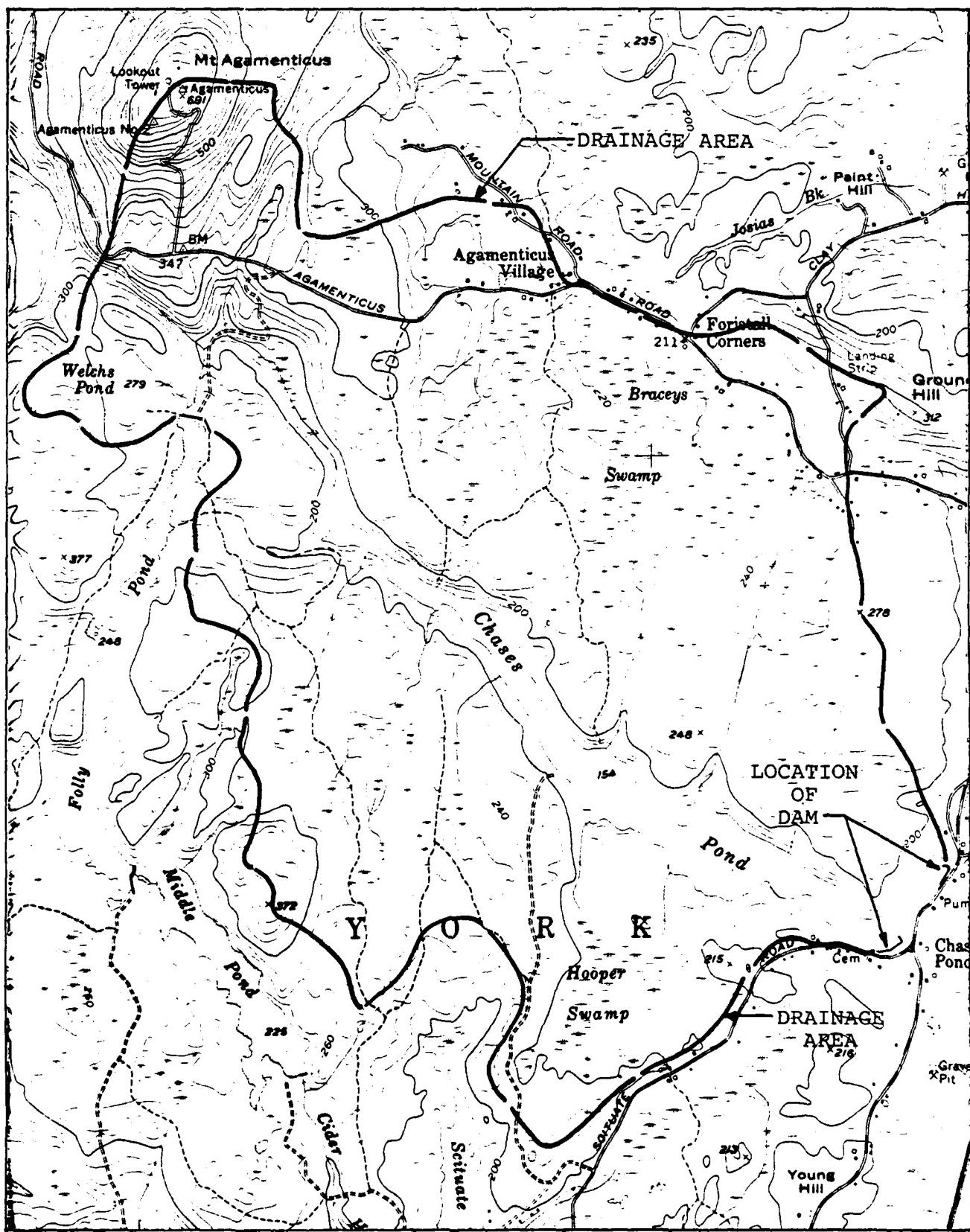
12. Little Pond and Little Pond Dam



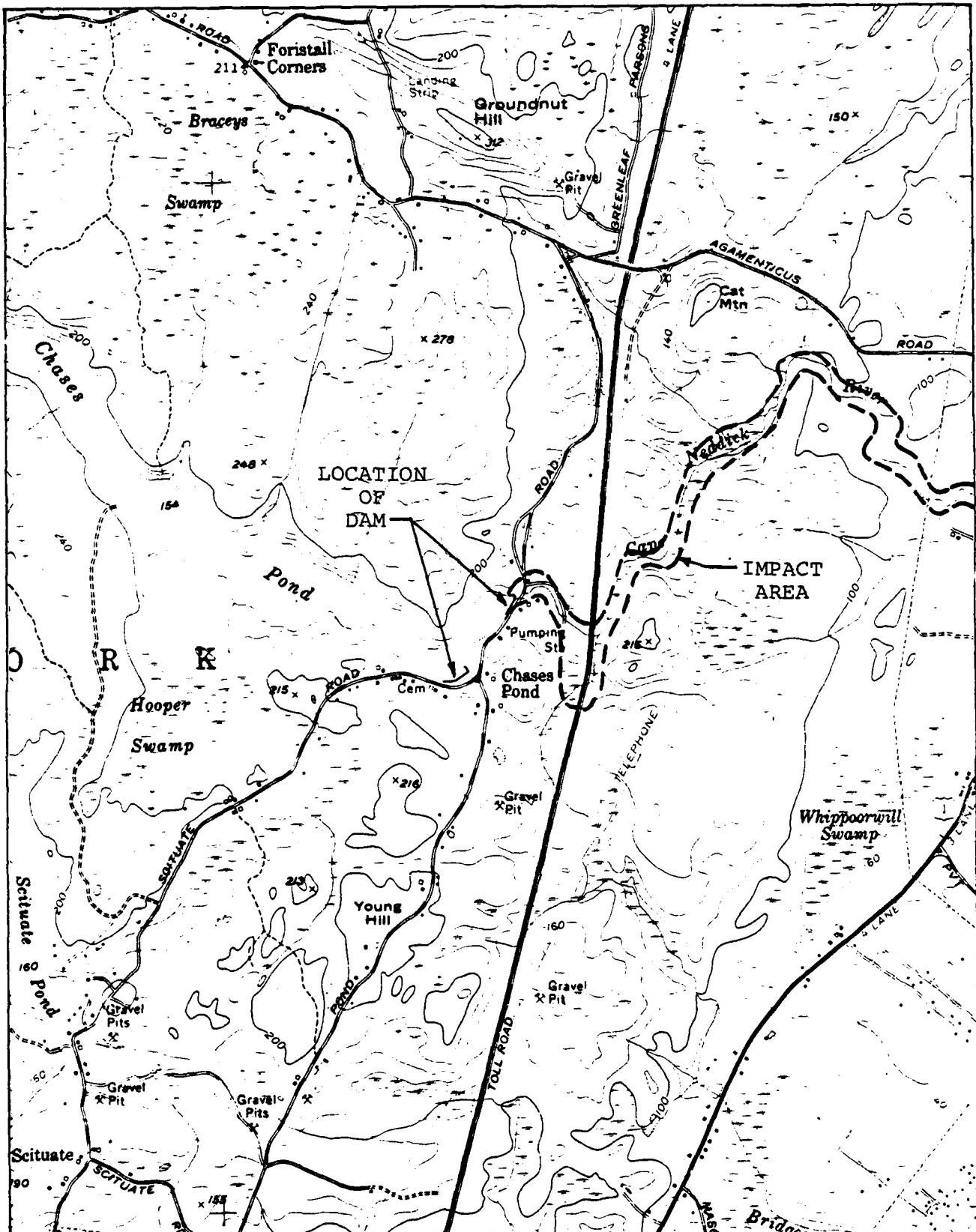
13. Overview of crest, upstream and downstream sides of earth dike 1,300 ft. southwest of dam site

APPENDIX D - HYDROLOGIC AND HYDRAULIC COMPUTATIONS

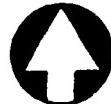
<u>MAPS</u>	<u>Page</u>
Drainage Area Map	D-1
Dam Failure Impact Area Map	D-2
<u>COMPUTATIONS</u>	
Elevations, Surface Areas, Storage Capacities and Size Classification	D-3
Hazard Classification, Test Flood Determination and Stage-Discharge Relationships	D-4
Surcharge-Storage Routing	D-5
Stage-Discharge and Storage-Elevation Curves ..	D-6
Tailwater Analysis	D-7
Dam Failure Analysis	D-9



DRAINAGE AREA
MAP



CHASES POND DAM
ME 00188



DAM FAILURE IMPACT AREA MAP

APPROX. SCALE: 1" = 2000'

CAMP DRESSER & MCKEE

CLIENT HALEY & ALDRICH
PROJECT DAM INSR
DETAIL CHASES PONDJOB NO. SD-10-RT-17COMPUTED BY JEDDATE CHECKED 3-11-80DATE 3/5/80CHECKED BY Joe APAGE NO. 1ELEVATIONS * (USGS)

Spillway Crest El. 157.6
 Top of Outlet Works Platform & 45' long Conc. Wall El. 162.7
 Top of 165' long left Earth Dike El. 164.7
 Top of Right 186' long Conc. Wall El. 162.7
 Top of Right 200' long Earth Dike El. 165.0
 Top of 500' long Remote Dike El. 162.7
 Toe of Spillway El. 144.1
 Inv. of Discharge Channel at Outlet Works El. 142.4

* Plans show spillway crest at El. 157.0. However,
 survey by owner puts spillway crest at El. 157.6.
 Therefore use 157.6 together with field & drawing dimensions.

SURFACE AREAS

$$\text{Drainage Area} = 2,590 \text{ ac.} = 4.1 \text{ sq. mi.}$$

$$\begin{aligned} \text{W.S. at El. 154} &= 129 \text{ ac.} \\ \text{Area at El. 160} &= 175 \text{ ac.} \end{aligned} \quad \left. \begin{array}{l} \text{USGS Quad., York Harbor, Me. 1956,} \\ \text{Rev. 1973} \end{array} \right\}$$

STORAGE CAPACITIES

$$\text{Water depth at spillway crest} = 15 \text{ ft.}$$

$$\text{Surface Area at El. 157.6} = \frac{175-129}{6} \times 3.6 + 129 = 157 \text{ ac.}$$

$$\text{Est. Volume at El. 157.6} = 15/2 \times 157 \approx 1,180 \text{ ac-ft.}$$

$$\text{Surface Area at El. 162.7} = \frac{175-129}{6} \times 2.7 + 175 = 196 \text{ ac.}$$

$$\text{Est. Volume at El. 162.7} = 1180 + \frac{175+196}{2} \times 5.1 = 2,126 \text{ ac.-ft.}$$

SIZE CLASSIFICATION

$$\text{Hydraulic Height} = 162.7 - 142.4 = 20.3 \text{ ft.}$$

$$\text{Storage at top of dam} = 2,126 \text{ ac-ft, say } 2,130 \text{ ac-ft.}$$

∴ Size is INTERMEDIATE based on storage.

HAZARD CLASSIFICATION

A failure of the dam and embankment to the left of the spillway would damage the Process facilities Bldg and inundated one residential house immediately off having a sill elev. approx. 6 ft. below top of dam. Potential loss of life would be a few.

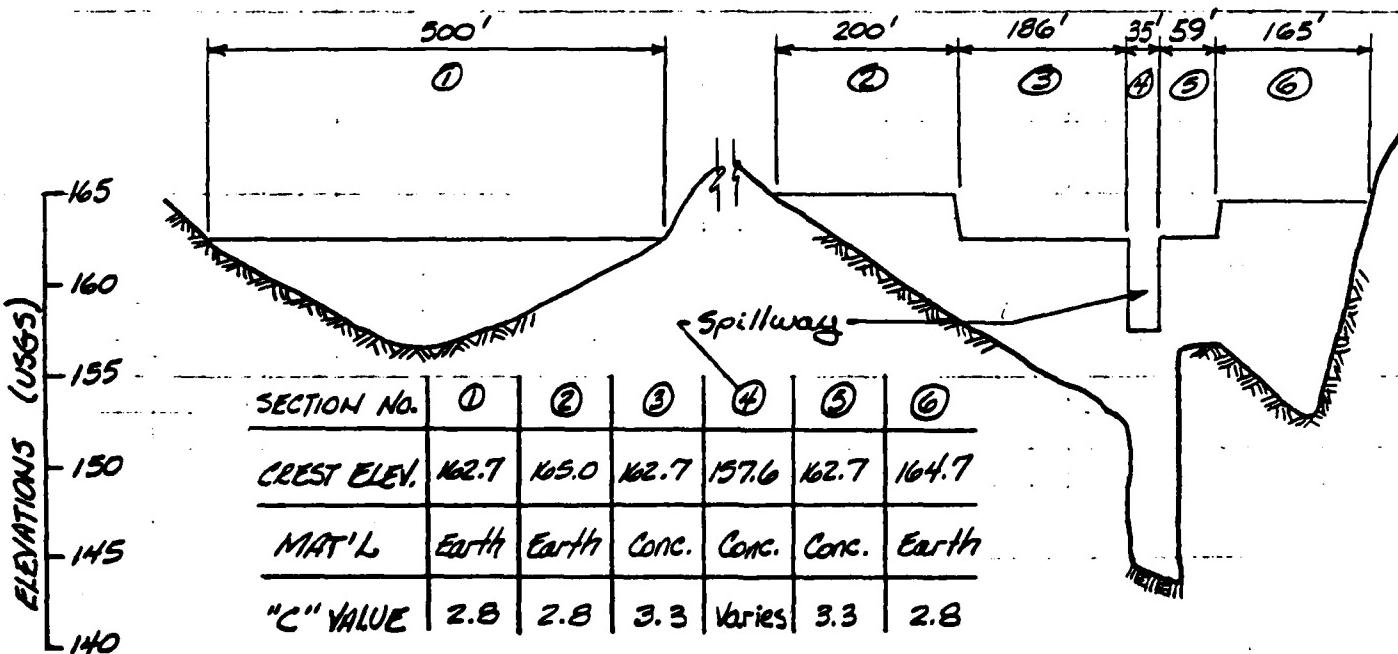
∴ Hazard classification is SIGNIFICANT

TEST FLOOD DETERMINATION

For an Intermediate size and significant hazard, COE Guidelines give test flood range of $\frac{1}{2}$ PMF to a full PMF (Probable Maximum Flood). Adopt $\frac{1}{2}$ PMF for test flood as size of dam is at low end of classification range.

With the exception of approx. 8% of the watershed which drains Mt. Agamenticus, the 4.1 sq. mi. drainage area is typical of Flat & Coastal terrain.

$$\text{then test flood inflow} = 4.1 \text{ mi}^2 \times 850 \text{ csm} \times \frac{1}{2} = 1743, \text{ say } 1750 \text{ cfs}$$

STAGE-DISCHARGE RELATIONSHIPSELEV. VIEW OF DAM AND DIKE LOOKING U/S

W.S. ELEV.	SECT. ① $L = 500 \text{ ft.}$ $C = 2.8$ $Q_1 (\text{cfs})$	SECT. ② $L = 200 \text{ ft.}$ $C = 2.8$ $Q_2 (\text{cfs})$	SECT. ③ & ⑤ $L = 245 \text{ ft.}$ $C = 3.3$ $Q_{3,5} (\text{cfs})$	SECT. ④: SPILLWAY 35 ft. Conc. Qgee		SECT. ⑥ $L = 165 \text{ ft.}$ $C = 2.8$ $Q_6 (\text{cfs})$	TOTAL DISCHARGE $Q_T (\text{cfs})$
	"C"	$Q_4 (\text{cfs})$					
157.6	-	-	-	-	0	-	
158.6	-	-	-	3.48	120	-	120
159.6	-	-	-	3.67	360	-	360
160.6	-	-	-	3.72	680	-	680
161.6	-	-	-	3.83	1,070	-	1,070
162.7	0	-	0	4.00	1,610	-	1,610
162.8	40	-	30	4.00	1,660	-	1,730
162.9	130	-	70	4.00	1,710	-	1,910
163.0	230	-	130	4.00	1,760	-	2,120

SURCHARGE - STORAGE ROUTING

$$\text{Test Flood Inflow} = 1750 \text{ cfs} = Q_{P1}$$

$$\text{Surcharge Height to pass } Q_{P1} = 162.82$$

$$\text{STOR}_1 = \frac{965 \text{ ac-ft} \times 12''/\text{ft}}{2590 \text{ acres}} = 4.47''$$

$$Q_{P2} = Q_{P1} \left(1 - \frac{\text{STOR}_1}{9.5''}\right) = 1750 \left(1 - \frac{4.47}{9.5}\right) = 930 \text{ cfs}$$

$$\text{Surcharge Height to pass } Q_{P2} = 161.25$$

$$\text{STOR}_2 = \frac{675 \text{ ac-ft} \times 12''/\text{ft}}{2590 \text{ ac.}} = 3.13''$$

$$\text{STOR}_A = \frac{3.13 + 4.47}{2} = 3.8''$$

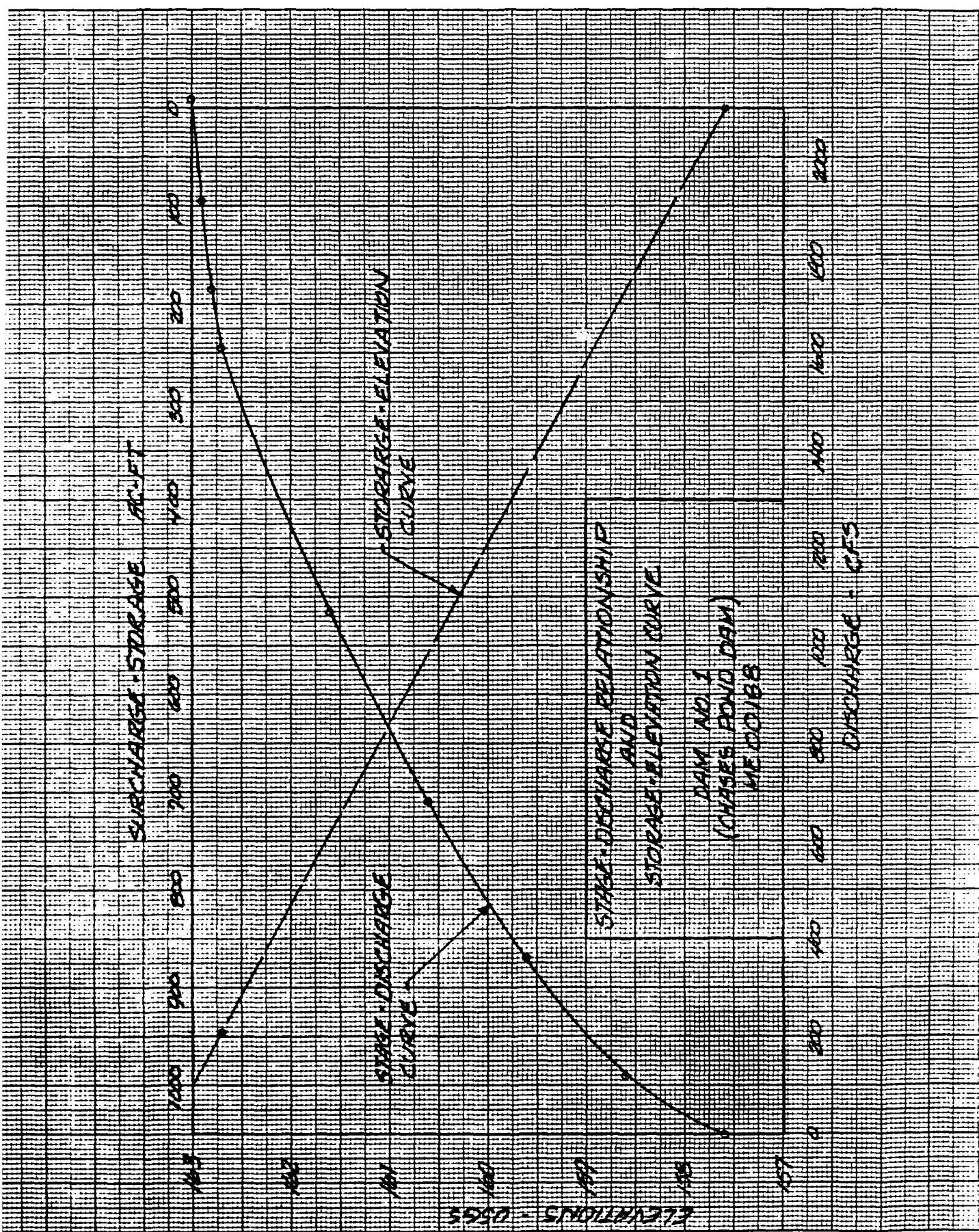
$$Q_{P3} = 1750 \left(1 - \frac{3.8}{9.5}\right) = 1,050 \text{ cfs}$$

$$\text{Surcharge Height to pass } Q_{P3} = 161.55$$

$$\text{STOR}_3 = \frac{730 \text{ ac-ft} \times 12''/\text{ft}}{2590 \text{ ac.}} = 3.38''$$

$$\text{STOR}_{A_2} = (3.38 + 3.80'')/2 = 3.59''$$

$$Q_{P4} = 1750 \left(1 - \frac{3.59}{9.5}\right) = 1,090 \text{ cfs}; \text{ say } 1,100 \text{ cfs @ El. 161.65 D-5}$$



LESSER & MCKEE CLIENT HALEY & ALDRICH
PROJECT DAM INSP.
DETAIL CHASES POND

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CHECKED BY Joe A. PAGE NO. 5

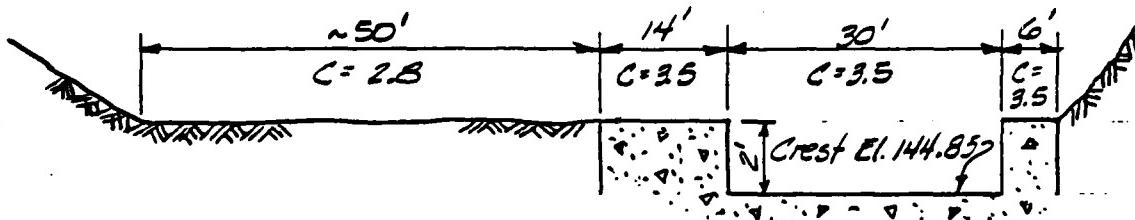
TAILWATER ANALYSIS

Spillway discharge at test flood = 1,100 cfs

D/S controls consist of:

- 15'w x 9.25'H Chases Pond Road Bridge located at the toe of the spillway
- Little Pond Dam located about 150' d/s of spillway

Little Pond Dam



ELEVATION VIEW LOOKING D/S

$$Q = CLH^{3/2} = 3.5 \times 30 \times H^{3/2} + 3.5 \times 20 \times (H-2)^{3/2} + 2.8 \times 50 \times (H-2)^{3/2} = 1,100$$

$$\text{then } 1,100 = 105H^{3/2} + 210(H-2)^{3/2} = Q$$

$$\text{If } H = 3.5 \text{ ft. } Q = 1,073 \text{ cfs}$$

$$H = 3.6 \text{ ft. } Q = 1,142 \text{ cfs}$$

$$\text{At } Q = 1,100 \text{ cfs, } H \approx 3.55 \text{ ft.}$$

Then backwater elev. on d/s face of Chases Pond Road Bridge is El. 148.4

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Chases Pond Road Bridge

.165

Test Flood Pond
Level El. 161.65

Top of Dam (outlet Works)
El. 162.7

.160

Spillway Crest
El. 157.6

.155

Top of Road El. 153.9

.150

Test Flood Tailwater
elev. on d/s face of
bridge from Little
Pond Dam

W.S. El. 148.4

.145

Channel Invert
El. 142.4

.140

D/S FACE OF BRIDGE W/DAM & SPILLWAY
IN BACKGROUND

Approx. W.S. Elev. at u/s face of bridge:

$$Q = CA(2gh)^{1/2} \quad \text{where } A = 15' \times 9.25' = 138.75 \text{ s.f.}$$

$$h = u/s \text{ W.S.} - 148.4$$

let C = 0.6 to account for all
energy losses

$$Q = 1,100 \text{ cfs}$$

$$\text{then } 1,100 = 0.6 \times 138.75 (64.4)^{1/2} (h)^{1/2} = 668 \times h^{1/2}$$

$$h = (1100/668)^2 = 2.7 \text{ ft.}$$

$$\therefore u/s \text{ W.S.} = 148.4 + 2.7 = El. 151.1$$

say tailwater at toe of spillway El. 152.0

ER & MCKEE CLIENT HALEY & ALDRICH JOB NO. 561-10-RT-17 COMPUTED BY JED
 PROJECT DAM INSP. DATE CHECKED 3-11-80 DATE 3/11/80
 DETAIL CHASES POND CHECKED BY Joe A. PAGE NO 7

DAM FAILURE ANALYSIS

Inspection of the dam revealed that the most critical dam failure section in terms of d/s hazard would be the 105 ft. long earth dike located to the left of the spillway.

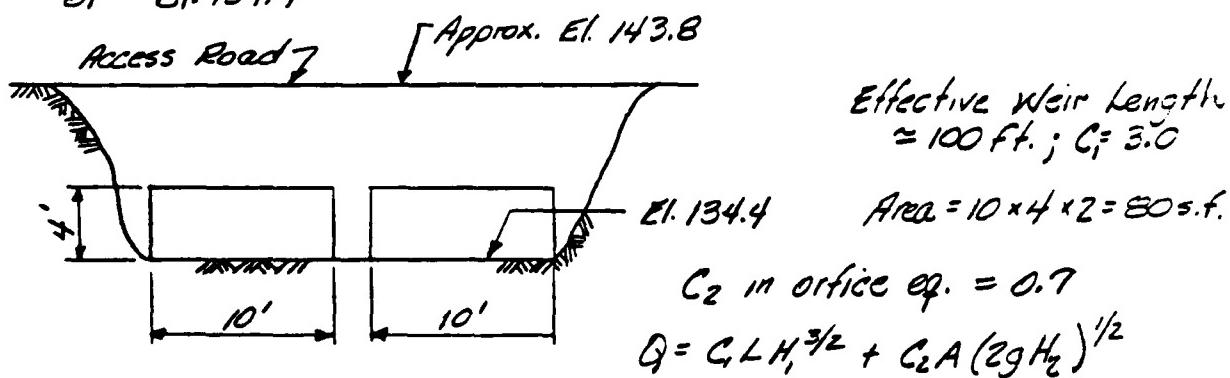
Approx. height (from plans) = 12 ft.
 " length " at mid-height = 140 ft.

$$Q_{PI} = \frac{8}{27} \pi g W_b Y_o^{3/2} = \frac{8}{27} \times (32.2)^{1/2} (0.4 \times 140) (12)^{3/2} \\ = 3,900 \text{ cfs}$$

This flow of nearly 4,000 cfs would impact on the Water Dept's Process Bldg and flood over Chases Pond Rd. before joining the d/s channel. Opposite this failed section of the dam on the d/s side of Chases Pond Road is a residential home with sill elev. approx. 6 ft. lower than top of dam. Potential loss of life would be a few.

After overtopping Chases Pond Rd., the failure outflow would join the d/s channel at about the location of Little Pond Dam and combine with the 1,100 cfs spillway discharge. Total flow = 5,000 cfs

About 150 ft. d/s of Little Pond Dam is a gravel access road with a twin box culvert with invert about 10.5 ft. below crest of Little Pond Dam or El. 134.4



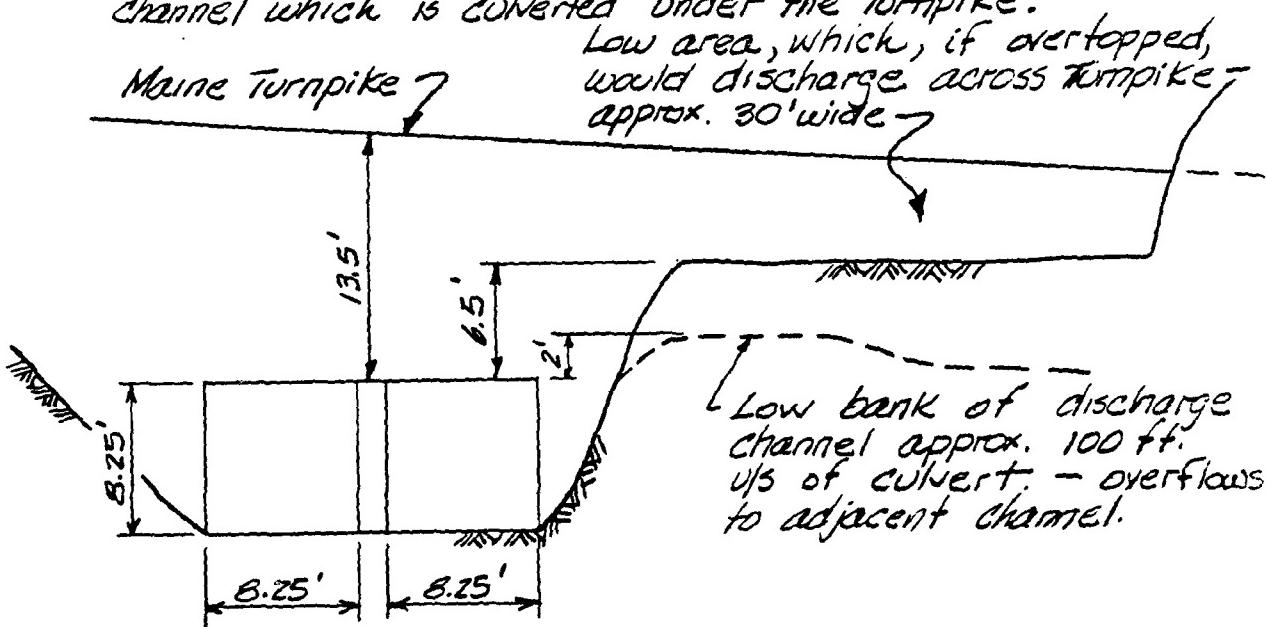
W.S. ELEV. :	143.8	148.0	149.0
H ₁ :	0	4.2'	5.2'
H ₂ :	5.4'	9.6'	10.6'
Q :	1,050 cfs	3,970 cfs	5,020 cfs

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DETAIL CHASES POND

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The dam failure outflow would overtop the gravel access road by about 5 ft. No structures would be affected nor is there any apparent potential for loss of life.

Approx. 1,000 ft. d/s of above access road is a twin box culvert beneath the Maine Turnpike. About 100 ft. u/s of the Turnpike culvert the right channel bank is low and overflows would flow out of channel and into adjacent channel which is converted under the Turnpike.



$$\text{If water depth} = \text{elev. of } 30'\text{ wide bw area}, h = 4.1' + 6.5' \\ = 10.6'$$

$$Q_f = 0.7 \times (8.25 \times 8.25) 2 (2g 10.6)^{1/2} = 2,490 \text{ cfs}$$

$$Q \text{ over right bank} \approx 2.8 \times 200' \times (4.5)^{3/2} = 5,350 \text{ cfs}$$

$$\therefore Q_T = 7,840 \text{ cfs} > \text{dam failure flow of } 5,000 \text{ cfs.}$$

Therefore, Maine Turnpike will not be overtopped at this location.

Potential loss of life is a few (house immediately d/s of dam) and hazard classification is

SIGNIFICANT

APPENDIX E - INFORMATION AS CONTAINED IN
THE NATIONAL INVENTORY OF DAMS

NOT AVAILABLE AT THIS TIME

END

FILMED

9-85

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